CDM

May 2005

Bay Area Water Quality and Supply Reliability Program

Final Report

Appendix G

CALFED
BAY-DELTA
PROGRAM

ACWD
ALAMEDA COUNTY WATER DISTRICT

BAWSCA

CONTRA COSTA
WATER DISTRICT

EBMUD

SFPUC

Santa Clara Valley
Water District

ZONE 7

Appendix G
Concept, Portfolio, and Agency Scorecards

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G1 Calaveras Reservoir Expansion – Water Quality and Supply Reliability

G1 Calaveras Reservoir Expansion –Water Quality and Supply Reliability

DESCRIPTION

The Calaveras Reservoir Expansion would involve a regional partnership to increase capacity from the existing size of 97,000 acre-feet (AF) to 420,000 AF. The California Division of Safety of Dams has identified potential seismic concerns with the existing dam. A San Francisco Public Utilities Commission (SFPUC) study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. This study is evaluating potential regional concepts for expanding the reservoir.

In the maximize water quality operating scenario, Hetch Hetchy water would be transferred into the expanded Calaveras Reservoir in average and wet years, and delivered water to the South Bay Aqueduct to provide a water quality benefit for the downstream SBA contractors ACWD and SCVWD. Dry-year supply deliveries could be made to SCVWD via the SFPUC system or to the SBA. Dry-year supply deliveries could be made to SCVWD and ACWD via the SBA.

For this concept, up to 50,000 AFY would be available for blending in average years, and up to 41,000 AFY would be available for dry-year deliveries. No attempt was made in this study to allocate supply amongst potential partners. For the scorecard, supply and water quality benefits were calculated based on the maximum potential deliveries to each potential partner. Therefore, benefits shown represent the maximum possible benefits available from the concept for each agency. Actual benefits would be less, if the available supply is allocated amongst participating partners.

Calaveras Expansion – Water Quality and Supply Reliability

Extended Dry Year Supply......................................41,000 AFY

Average Year Water Quality Supply....................50,000 AFY

Cost
Capital Cost ....$426M ($2003)
O&M Cost..$3.5M/Yr ($2003)
Unit Cost..TBD in future studies

Potential Owning Agency
SFPUC

Potential Partners
ACWD, BAWSCA, SCVWD, SFPUC(1)

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

Potential Partner and Supply Amounts

Type of Benefit	Potential Amount (AFY)	Notes/Issues
ACWD and SCVWD		
Average Year Water Quality	Up to 50,000 AFY	Up to 50,000 AFY could be transferred to the SBA downstream of Zone 7.
SFPUC(1) ACWD and SCVWD		
Dry-Year Supply	Up to 41,000 AFY	Up to 41,000 AFY could be transferred to the SBA downstream of Zone 7 or delivered to the SFPUC system.

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

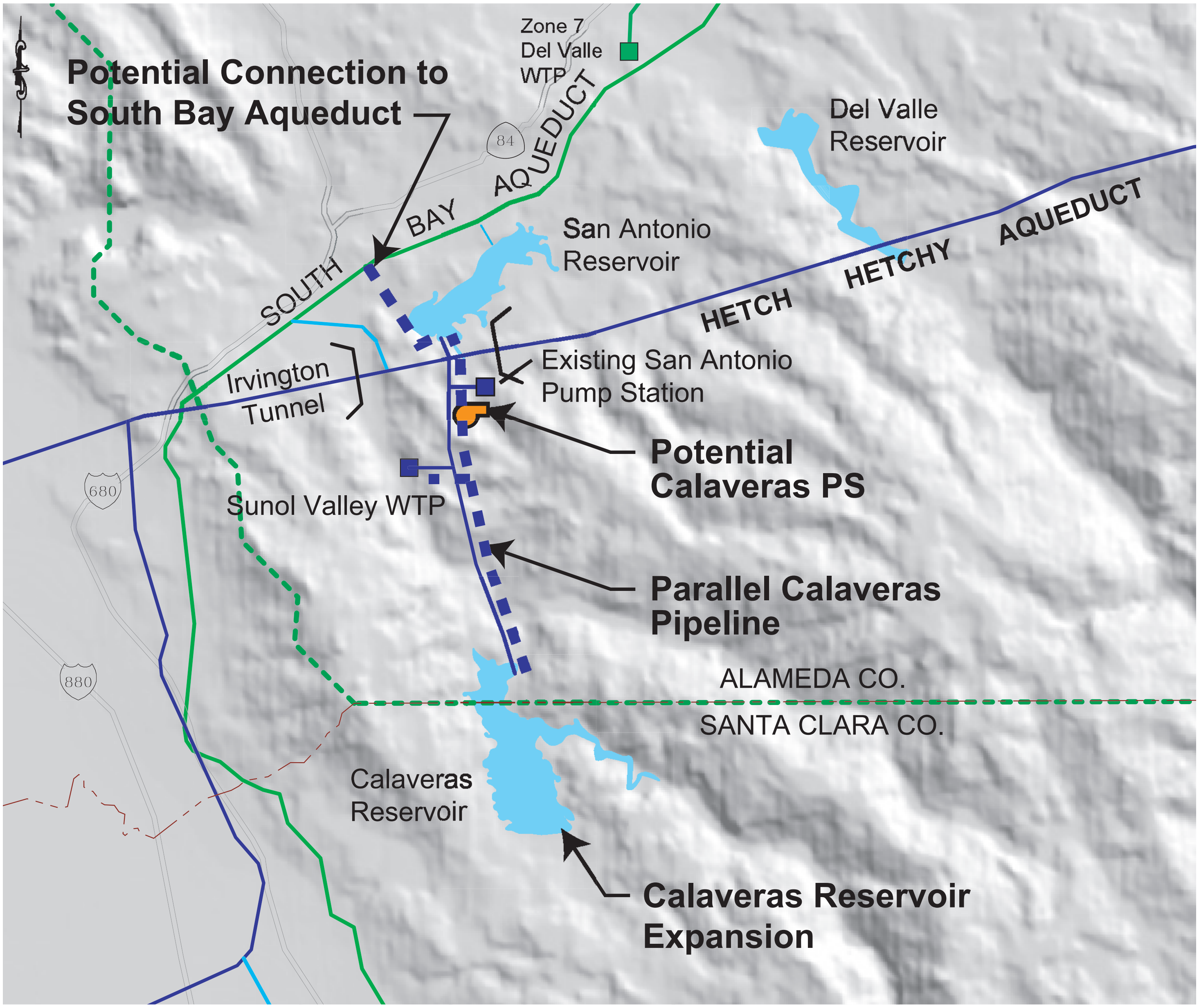


Figure G1-1
Calaveras Reservoir Expansion
420,000 Acre-Feet

CDM

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Table G1-1 - Supply Reliability Score Card

Performance Objective/Subobjective	Agency Baseline		Calaveras Reservoir Expansion Concept		Agency Baseline Plus Calaveras Reservoir Expansion Concept		Notes/Other
	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	
Meet Demand[1]	Compares supply from concept with baseline supply						
Critical Drought							Results reported for maximize water quality operation of a 420,000 AF expanded reservoir, for 41,000 AFY dry-year yield and 50,000 AFY delivered in average or wet years either through interconnections with the SFPUC system, or directly into the SBA downstream of Zone 7. Water quality results shown for blending of Calaveras supply with ACWD and SCVWD SBA supplies downstream of Zone 7.
ACWD Supply (SWP)	20,600	AFY	Up to 41,000	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply[1]	137,800	AFY	Up to 41,000	AFY	Up to 178,800	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	39,400	AFY	Up to 41,000	AFY	Up to 80,400	AFY	
SFPUC Supply[2]	157,000	AFY	Up to 41,000	AFY	Up to 198,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[3]	217,000	AFY	Up to 41,000	AFY	Up to 258,000	AFY	
Extended Drought							
ACWD Supply (SWP)	25,500	AFY	Up to 41,000	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply[1]	209,900	AFY	Up to 41,000	AFY	Up to 250,900	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	63,000	AFY	Up to 41,000	AFY	Up to 97,800	AFY	
SFPUC Supply[2]	255,000	AFY	Up to 41,000	AFY	Up to 296,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[3]	343,500	AFY	Up to 41,000	AFY	Up to 384,500	AFY	
Average Year (1984)							
ACWD Supply (SWP)	42,700	AFY	Up to 50,000	AFY	42,700	AFY	
BAWSCA Agencies' Supply[1]	345,000	AFY	0	AFY	345,000	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	97,800	AFY	Up to 50,000	AFY	97,800	AFY	
SFPUC Supply[2]	329,000	AFY	0	AFY	329,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[3]	469,500	AFY	Up to 50,000	AFY	469,500	AFY	
Vulnerability							
ACWD	SBA contractors susceptible to water quality problems in the Delta, including potential Delta levee failures during a major seismic event.		Reduces Vulnerability - Calaveras Reservoir expansion reduces vulnerability of SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
BAWSCA[1]	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - Reduction in vulnerability resulting from reduced vulnerability of SCVWD and SFPUC systems.				
CCWD	N/A		N/A				
EBMUD	N/A		N/A				
SCVWD	SBA contractors susceptible to water quality problems in the Delta, including potential Delta levee failures during a major seismic event.		Reduces Vulnerability - Calaveras Reservoir expansion reduces vulnerability of SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		Reduces Vulnerability - Provides additional supply flexibility for maintenance outages or water quality events in Hetch Hetchy Aqueduct supply. Reduces vulnerability to sesmic events on Calaveras fault.				
Zone 7	N/A		N/A				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - The project would be locally controlled.							

1. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.
2. SFPUC is a potential beneficiary for supply reliability only, and is not seeking water quality benefits.
3. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Table G1-2 - Public Health Protection Scorecard

Concept: Calaveras Reservoir Expansion [1]

	Concept		Baseline Plus Concept		
Performance Measure/Objective	**Calaveras Reservoir Expansion Source Water**	**Calaveras Reservoir Expansion Treated Water**	**Calaveras Reservoir Expansion Source Water**	**Calaveras Reservoir Expansion Treated Water**	**Notes**
Variability for Treatment					
ACWD	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
BAWSCA Agencies[2]	NA	NA	NA	NA	BAWSCA Agencies receive treated supplies.
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
SFPUC[3]	NA	NA	No Effect on Variability for Treatment	NA	Expansion will have a minimal effect on source water quality
Zone 7	NA	NA	NA	NA	
Total Dissolved Solids					
ACWD	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
BAWSCA Agencies[2]	NA	NA	Reduces TDS	NA	Reduction in TDS with respect to SBA supply, minimal effect with respect to SFPUC supply
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
SFPUC[3]	NA	NA	No Effect on TDS	NA	Expansion will have a minimal effect on source water TDS
Zone 7	NA	NA	NA	NA	
Disinfection By-Products					
ACWD	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
BAWSCA Agencies[2]	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
SFPUC[3]	NA	NA	NA	No Effect on DBPs	Expansion will have a minimal effect on treated water DBP production
Zone 7	NA	NA	NA	NA	
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	NA	NA	Improves T&O	Improvement in source water quality
BAWSCA Agencies[2]	NA	NA	NA	Improves T&O	Improvement in overall water quality
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	NA	Improves T&O	Improvement in source water quality
SFPUC[3]	NA	NA	NA	No Effect on T&O	Expansion is not expected to significantly affect taste and odor
Zone 7	NA	NA	NA	NA	
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
BAWSCA Agencies[2]	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
SFPUC[3]	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
Zone 7	NA	NA	NA	NA	
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
BAWSCA Agencies[2]	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	
SFPUC[3]	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	
Zone 7	NA	NA	NA	NA	

1. Water quality evaluations for ACWD and SCVWD address water quality benefits resulting from blending Calaveras and SBA supplies
2. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.
3. SFPUC is a potential beneficiary for supply reliability only, and is not seeking water quality benefits.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Table G1-2a - Public Health Protection Score Card by Agency

Agency: ACWD[1]

			Agency Baseline			Concept		Baseline Plus Concept			
Performance Measure/Objective	Metric or Qual	Units	ACWD Source Water (SWP)	ACWD Treated Water (MSJWTP)	ACWD Treated Water (WTP 2)	Calaveras Expansion Concept Source Water	Calaveras Expansion Concept Treated Water	Calaveras Expansion plus Agency Baseline Source Water	Calaveras Expansion plus Agency Baseline Treated Water (MSJWTP)	Calaveras Expansion plus Agency Baseline Treated Water (WTP 2)	Notes
Supply Quantity											
Critical Year		AFY	20,600			41,000		N/A[1]			
Extended Dry Year		AFY	25,500			41,000		N/A[1]			
Average Year		AFY	42,700			50,000		42,700[1]			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	NA	0.17 - 0.23	0.12 - 0.17	0.15 - 0.20	
	Mean	mg/L	0.37	0.28	0.33	NA	NA	0.21	0.15	0.19	
TOC	Range	mg/L	3.4 - 7.3	2.9 - 6.4	2.3 - 5.5	NA	NA	3.1 - 5.2	2.6 - 4.5	2.1 - 3.8	
	Mean	mg/L	5.06	4.38	3.7	NA	NA	4.0	3.4	2.8	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.51	0.04 - 0.47	NA	NA	0.05 - 0.23	0.03 - 0.17	0.04 - 0.21	
	Mean	mg/L	0.26	0.20	0.23	NA	NA	0.17	0.12	0.15	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	NA	NA	1.7 - 6.8	1.4 - 6.0	1.0 - 5.1	
	Mean	mg/L	3.70	3.17	2.6	NA	NA	3.4	2.9	2.3	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	NA	0.08 - 0.11	0.05 - 0.08	0.07 - 0.10	
	Mean	mg/L	0.19	0.14	0.17	NA	NA	0.10	0.07	0.09	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	NA	2.2 - 4.3	1.8 - 3.7	1.4 - 3.0	
	Mean	mg/L	3.99	3.43	2.8	NA	NA	3.3	2.8	2.2	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	NA	276 - 315	298 - 338	307 - 347	
	Mean	mg/L	507	529	561	NA	NA	312	334	343	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	NA	166 - 324	188 - 346	197 - 355	
	Mean	mg/L	384	406	438	NA	NA	266	289	298	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	NA	173 - 195	195 - 218	204 - 226	
	Mean	mg/L	296	319	350	NA	NA	182	205	213	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	2 - 6	NA	NA	NA	ND - ND	2 - 2	
	Mean	ug/L	NA	ND	4	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	82 - 153	26 - 42	NA	NA	NA	73 - 107	23 - 31	
	Mean	ug/L	NA	110	33	NA	NA	NA	87	27	
HAA5	Range	ug/L	NA	47 - 75	16 - 21	NA	NA	NA	47 - 66	16 - 20	
	Mean	ug/L	NA	61	19	NA	NA	NA	56	18	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 5	NA	NA	NA	ND - ND	1 - 2	
	Mean	ug/L	NA	ND	3	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	50 - 142	16 - 38	NA	NA	NA	49 - 119	16 - 32	
	Mean	ug/L	NA	83	26	NA	NA	NA	74	23	
HAA5	Range	ug/L	NA	22 - 92	11 - 26	NA	NA	NA	24 - 92	12 - 26	
	Mean	ug/L	NA	52	17	NA	NA	NA	51	17	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 4	NA	NA	NA	ND - ND	1 - 1	
	Mean	ug/L	NA	ND	2	NA	NA	NA	ND	1	
THM4	Range	ug/L	NA	68 - 116	21 - 33	NA	NA	NA	51 - 85	17 - 25	
	Mean	ug/L	NA	85	26	NA	NA	NA	69	22	
HAA5	Range	ug/L	NA	41 - 74	14 - 22	NA	NA	NA	32 - 64	15 - 21	
	Mean	ug/L	NA	57	19	NA	NA	NA	52	18	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall quality	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

1. Critical and Extended Dry Year water quality evaluations assume delivery of 41,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7. Average year water quality evaluation assumes delivery of 50,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7. Water quality evaluations address water quality benefits resulting from blending Calaveras and SBA supplies.

Calaveras Reservoir Expansion Concept
(Water Quality and Supply Reliability Scenario)

Table G1-2b - Public Health Protection Score Card by Agency

Agency: SCVWD[1]

			Agency Baseline		Concept		Baseline Plus Concept		
Performance Measure/Objective	Metric or Qual	Units	SCVWD Source Water (SWP)	SCVWD Treated Water (SWP)	Calaveras Expansion Concept Source Water	Calaveras Expansion Concept Treated Water	Calaveras Expansion plus Agency Baseline Source Water	Calaveras Expansion plus Agency Baseline Treated Water	Notes
Supply Quantity									
Critical Year		AFY	39,400		41,000		80,400		
Extended Dry Year		AFY	63,000		41,000		97,800		
Average Year		AFY	97,800		50,000		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	NA	0.17 - 0.23	0.15 - 0.20	
	Mean	mg/L	0.37	0.33	NA	NA	0.21	0.19	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	NA	3.1 - 5.2	2.2 - 4.0	
	Mean	mg/L	5.1	3.9	NA	NA	4.0	3.0	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	NA	0.05 - 0.23	0.04 - 0.21	
	Mean	mg/L	0.26	0.24	NA	NA	0.17	0.15	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	NA	1.7 - 6.8	1.0 - 5.4	
	Mean	mg/L	3.7	2.7	NA	NA	3.4	2.4	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	NA	0.08 - 0.11	0.07 - 0.12	
	Mean	mg/L	0.19	0.17	NA	NA	0.10	0.10	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	NA	2.2 - 4.3	1.4 - 3.2	
	Mean	mg/L	4.0	3.0	NA	NA	3.3	2.3	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	NA	276 - 315	296 - 335	
	Mean	mg/L	507	527	NA	NA	312	332	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	NA	166 - 324	185 - 343	
	Mean	mg/L	384	404	NA	NA	266	286	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	NA	173 - 195	192 - 215	
	Mean	mg/L	296	316	NA	NA	182	202	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	NA	NA	3 - 4	
	Mean	mg/L	NA	6	NA	NA	NA	4	
THM4	Range	mg/L	NA	27 - 44	NA	NA	NA	24 - 33	
	Mean	mg/L	NA	34	NA	NA	NA	28	
HAA5	Range	mg/L	NA	11 - 14	NA	NA	NA	11 - 14	
	Mean	mg/L	NA	13	NA	NA	NA	12	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	NA	NA	1 - 4	
	Mean	mg/L	NA	4	NA	NA	NA	3	
THM4	Range	mg/L	NA	16 - 40	NA	NA	NA	16 - 34	
	Mean	mg/L	NA	27	NA	NA	NA	24	
HAA5	Range	mg/L	NA	7 - 18	NA	NA	NA	8 - 18	
	Mean	mg/L	NA	11	NA	NA	NA	11	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	NA	NA	1 - 2	
	Mean	mg/L	NA	3	NA	NA	NA	2	
THM4	Range	mg/L	NA	22 - 34	NA	NA	NA	18 - 27	
	Mean	mg/L	NA	27	NA	NA	NA	23	
HAA5	Range	mg/L	NA	9 - 15	NA	NA	NA	9 - 13	
	Mean	mg/L	NA	12	NA	NA	NA	12	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		moderate	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Critical and Extended Dry Year water quality evaluations assume delivery of 41,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7. Average year water quality evaluation assumes delivery of 50,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7. Water quality evaluations address water quality benefits resulting from blending Calaveras and SBA supplies.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Table G1-3 - Cost, Environmental and Implementation Score Card

	Concept Rating	**Notes/Other**
Cost Impacts		
Total Cost		
Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing st
Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): High Impact.** Potential effects are primarily associated with aquatic and terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land and water resources. In addition, other facility development could also affect sensitive biological resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts in and around the watershed at a 3:1 ratio or at a ratio that is deemed appropriate by regulatory agencies.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits**. The concept has the potential to reduce Delta fisheries impacts, as it would reduce pumping during the normal and wet years. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Protection, restoration, and enhancement of habitat for plants and wildlife species would be considered a benefit since the acreage protected, restored, or enhanced would likely exceed that affected by concept implementation.	
Implementation Potential		
External Support	TBD[1] - Historically, use of desalination, water recycling and enhanced conservation rather than storage concepts have been viewed as environmentally friendly alternatives and generated more support than storage projects.	
Ability to Get Outside Funding	TBD[1]	
Consistency with Local and Regional Plans	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	3	ACWD, SCVWD, SFPUC (retail and wholesale)
Population Receiving Benefits	4,700,000 people	

1. To be determined in future studies.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Table G1-4 - Environmental Score Card

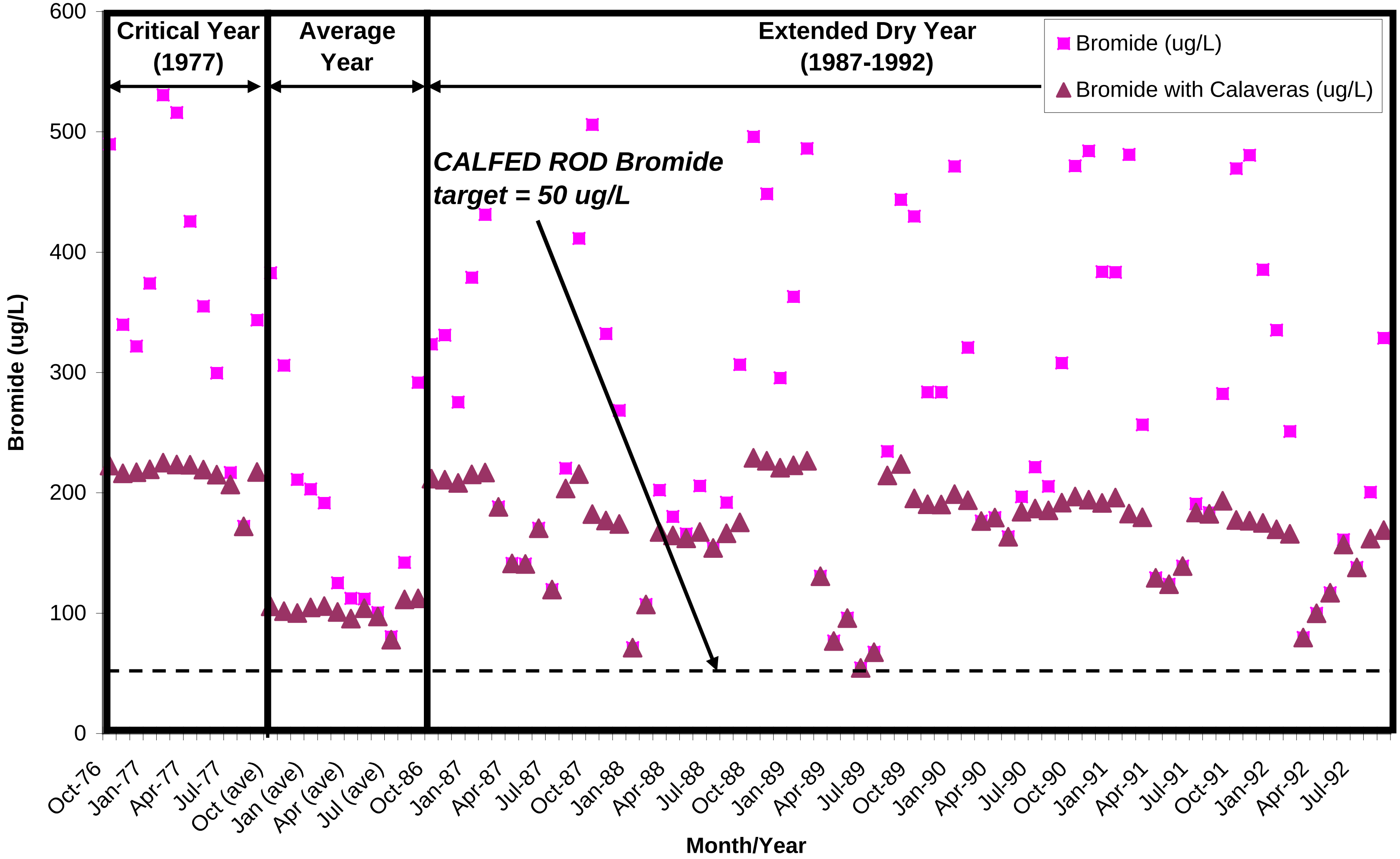
Performance Measure/Objective	Concept Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could then affect habitat for fish. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this would require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions). In addition, continue trout planting.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Direct effects from inundation of terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and an area of potential serpentine associated plants. Additional disturbed acreage associated with construction of other facilities (e.g., pipeline, pump station). **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed. In addition, consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Restoration of affected habitat may occur at a 3:1 ratio, or as negotiated with regulatory agencies.
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** Direct effects to marsh habitat from inundation. Siting of other permanent facilities and construction of conveyance facilities may also affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities would be similar to those described above for Terrestrial Environment. Affected lands would be restored at a ratio deemed appropriate by regulatory agencies.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply.
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** The energy requirement associated with concept operation is not known. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** More information would be required to identify potential effects and mitigation opportunities.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

1. To be determined in future studies.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of ACWD Source Water Bromide with Calaveras (Water Quality Operation) Concept Bromide

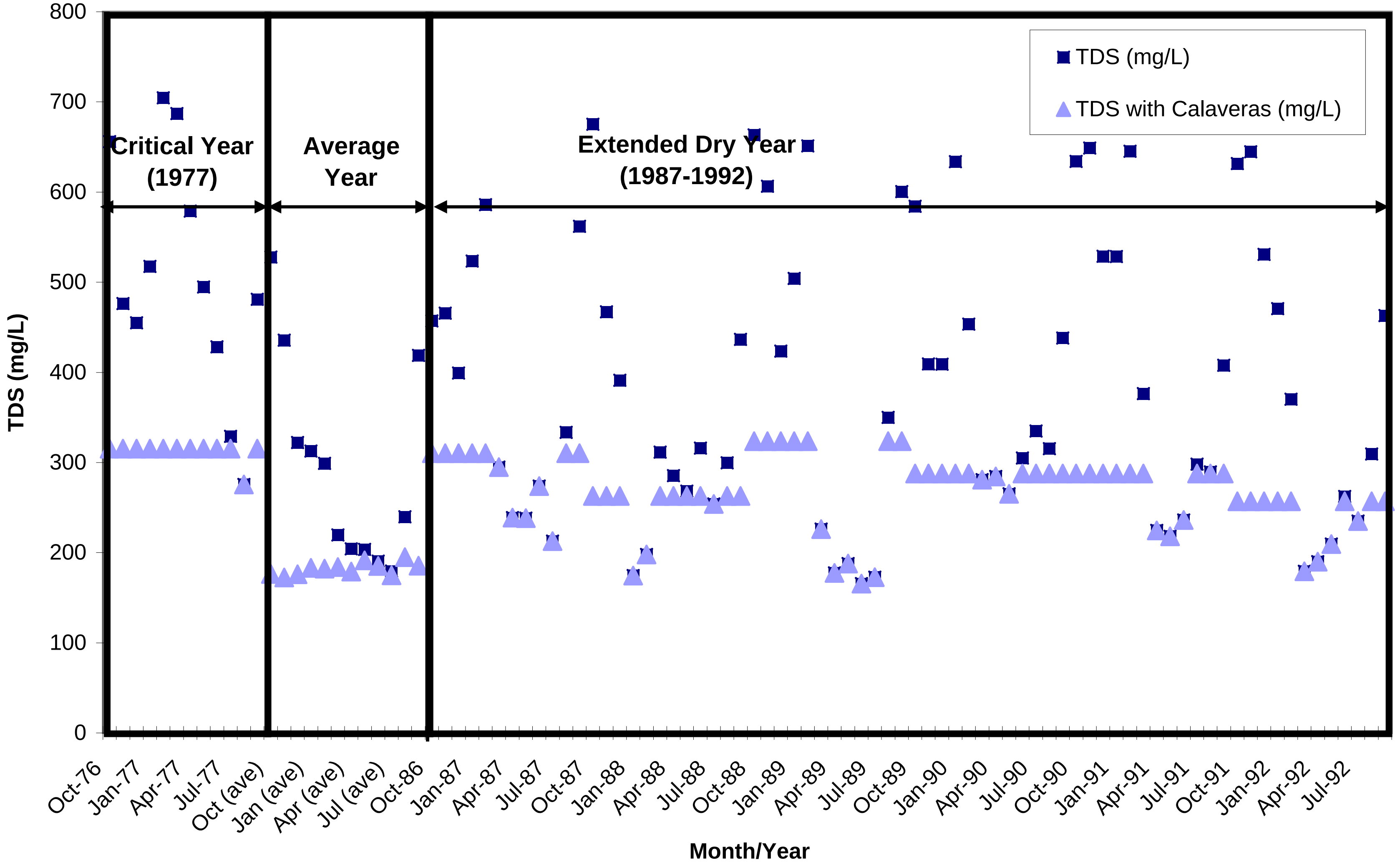


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of ACWD Source Water TDS with Calaveras (Water Quality Operation) Concept TDS

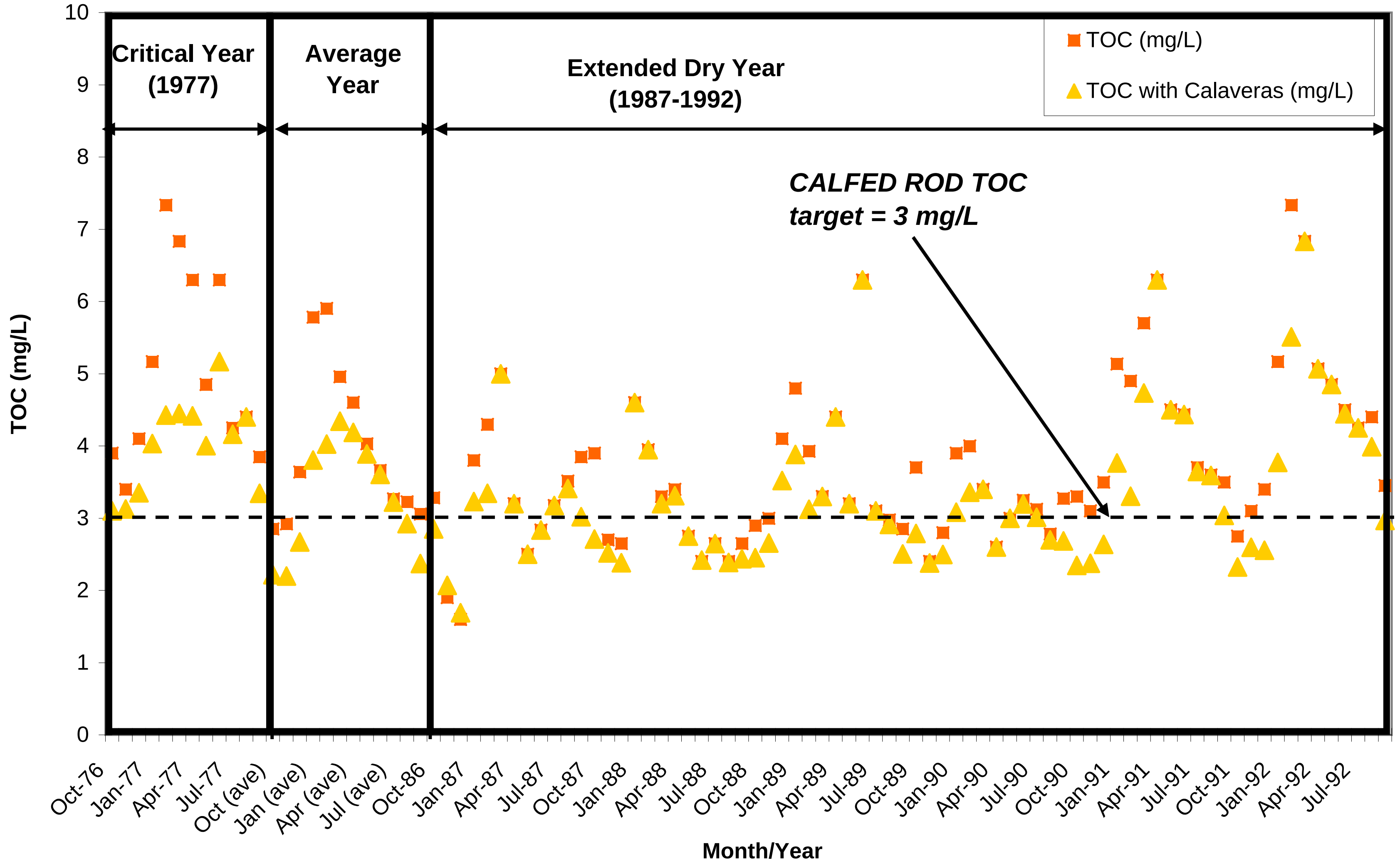


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of ACWD Source Water TOC with Calaveras (Water Quality Operation) Concept TOC

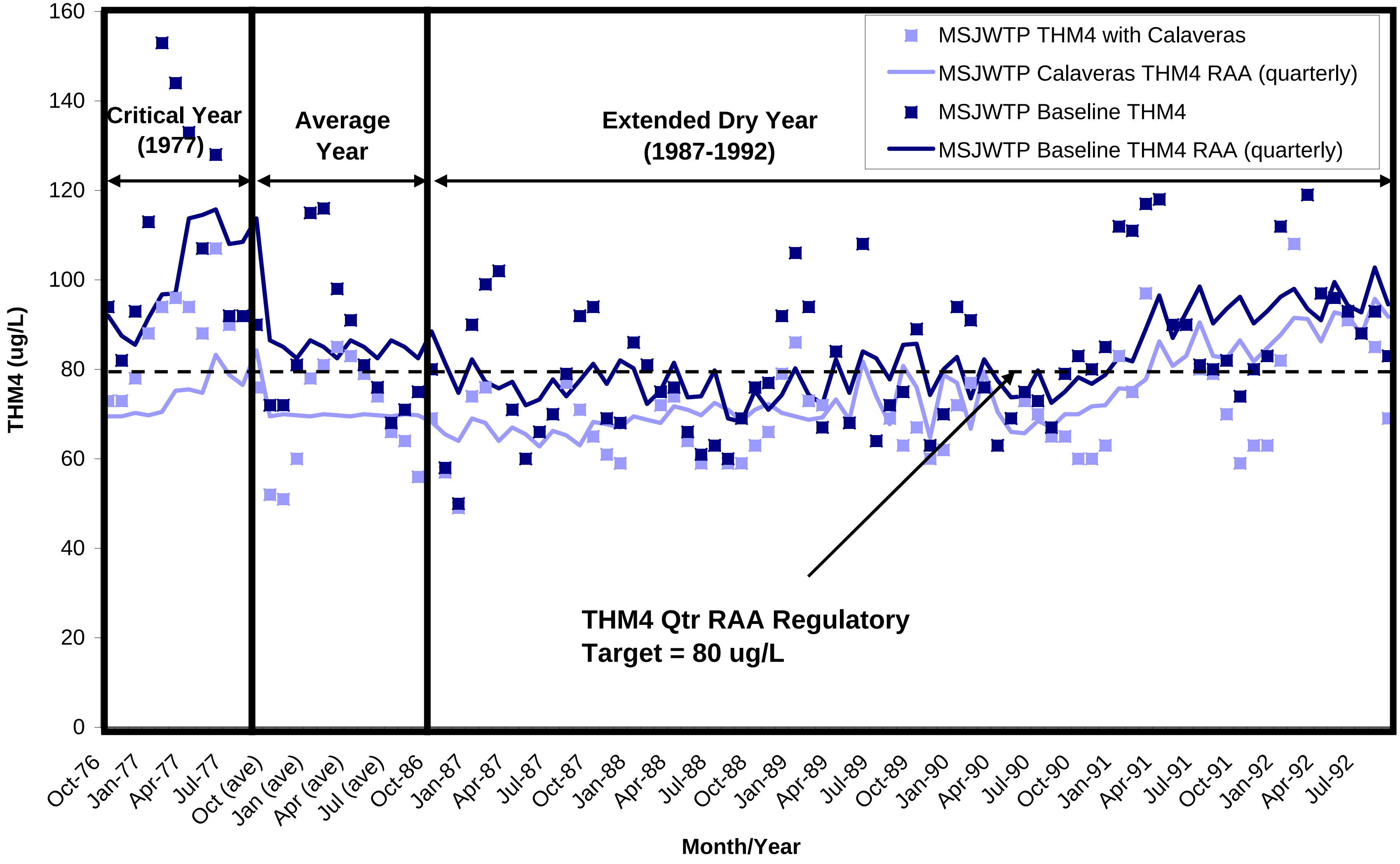


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of ACWD Baseline THM4 with Calaveras (Water Quality Operation) Concept THM4 (MSJWTP)

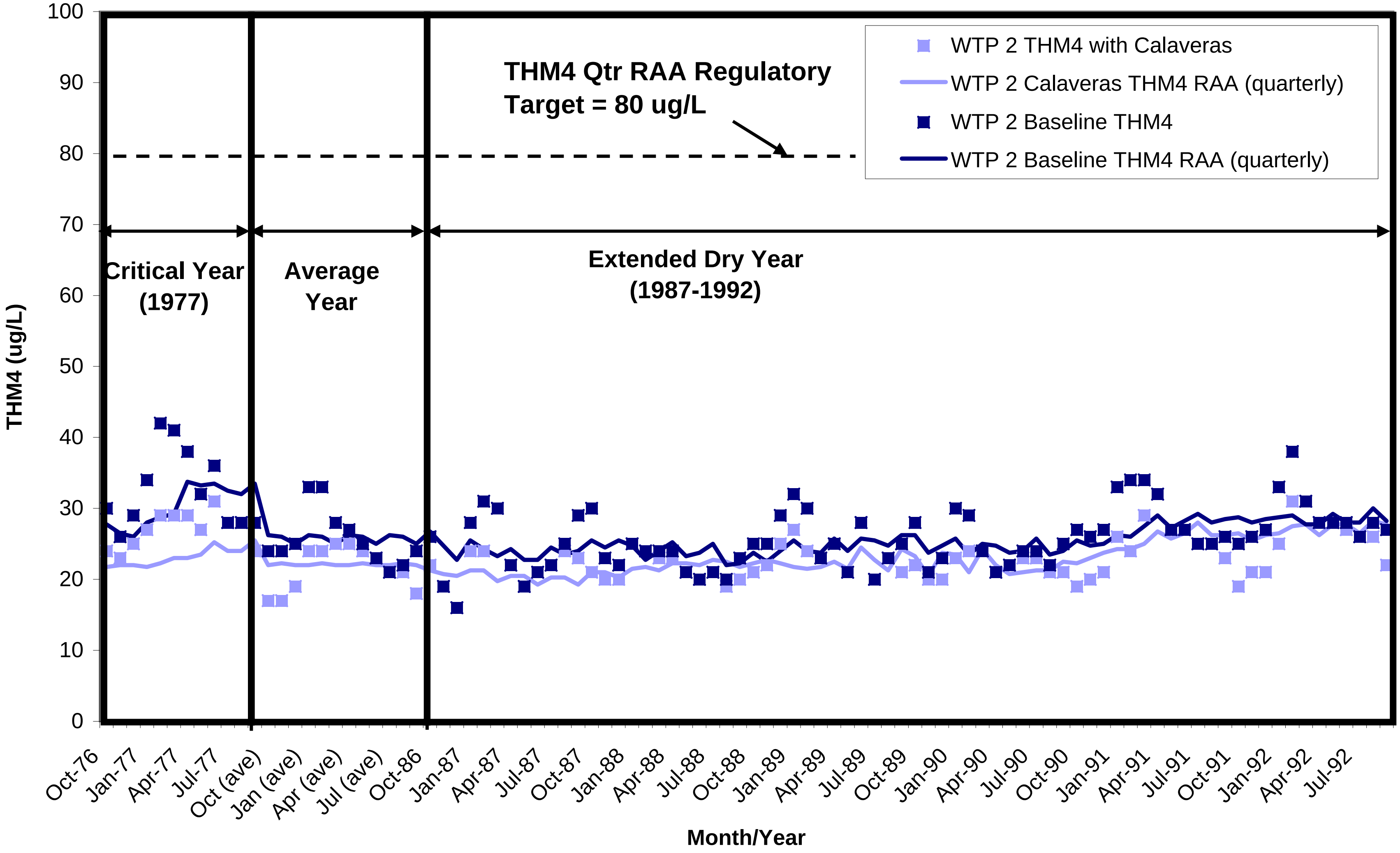


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for MSJWTP treatment.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of ACWD Baseline THM4 with Calaveras (Water Quality Operation) Concept THM4 (WTP 2)

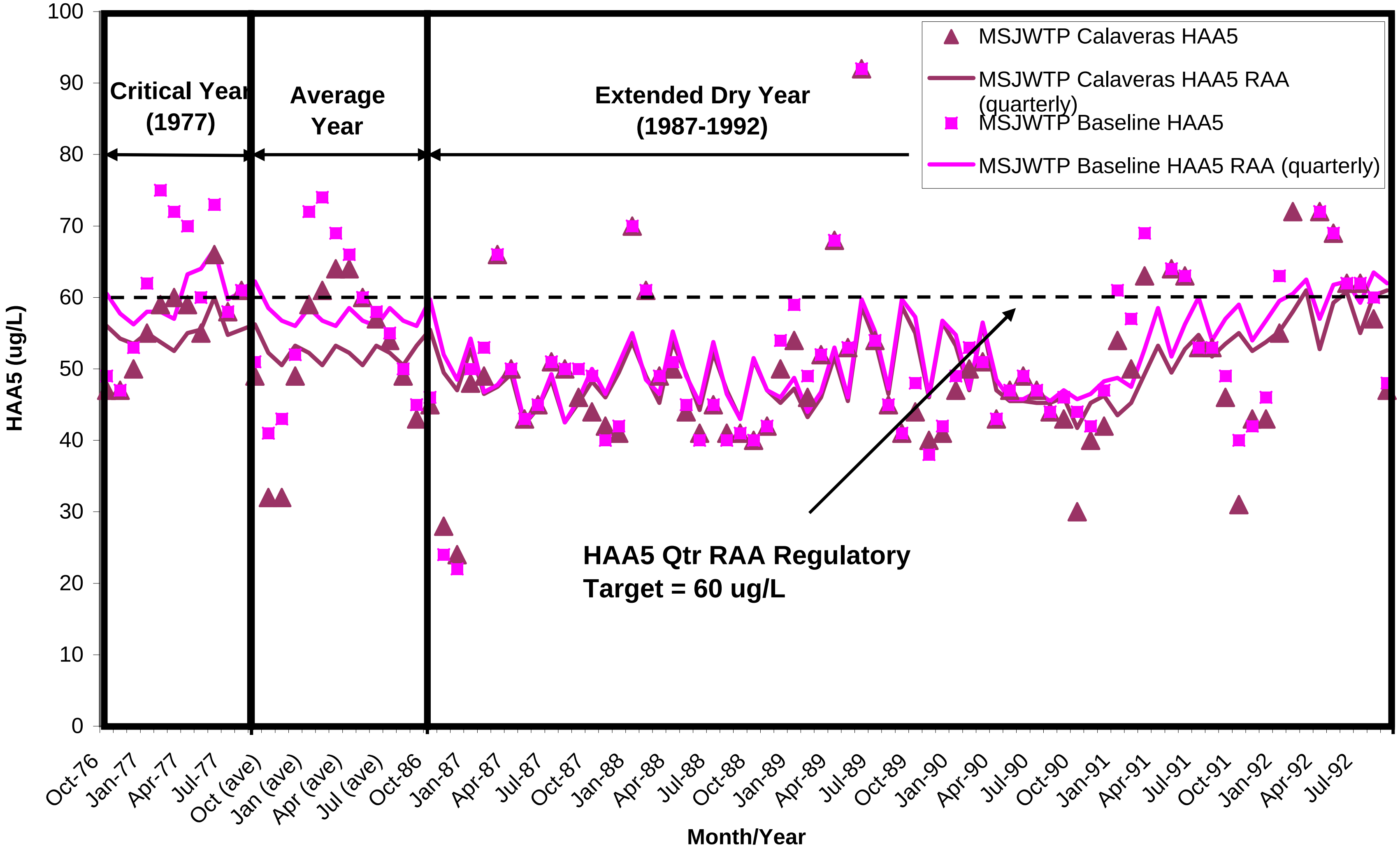


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for WTP 2 treatment.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

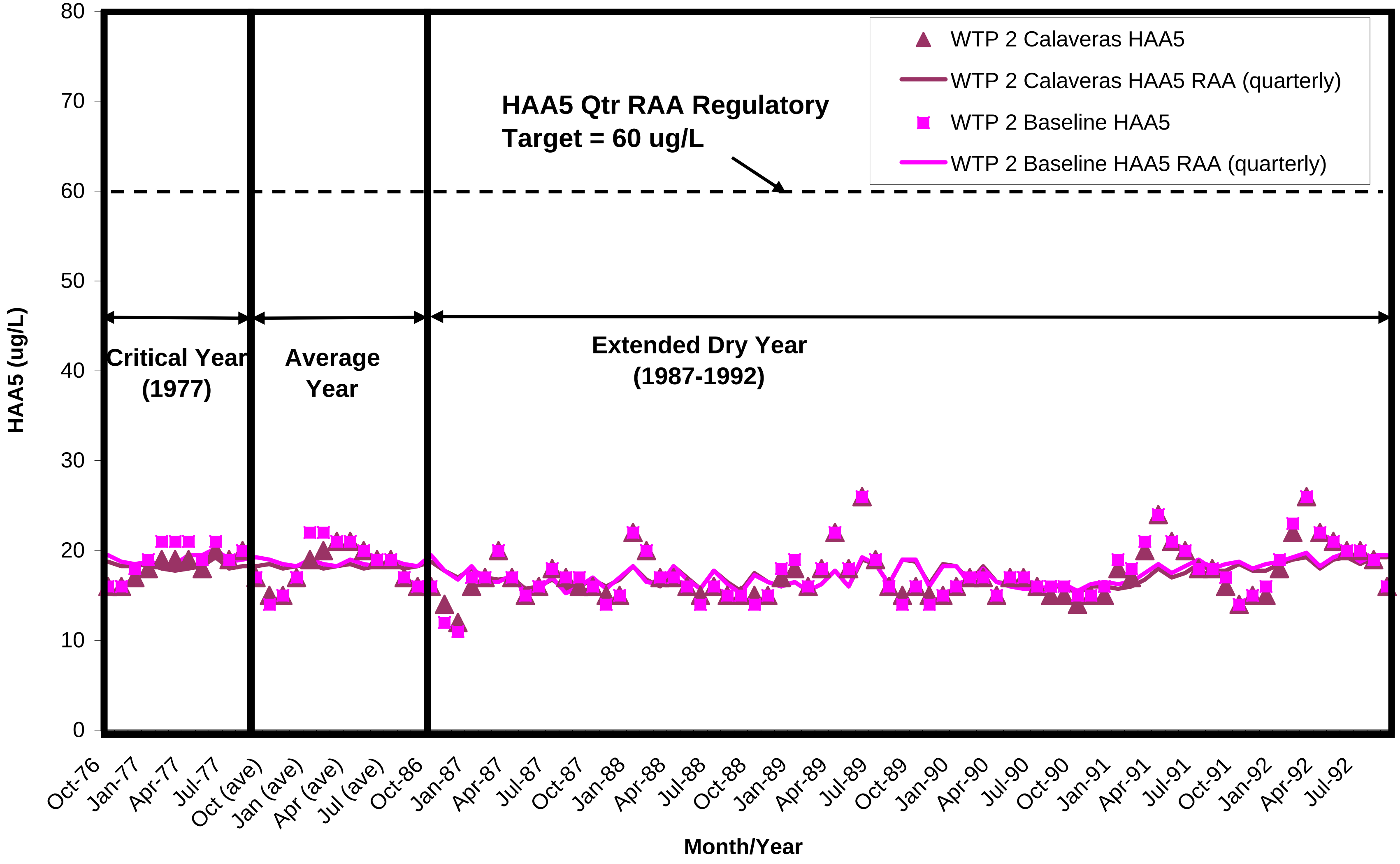
Comparison of ACWD Baseline HAA5 with Calaveras (Water Quality Operation) HAA5 (MSJWTP)



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for WTP 1 .

Calaveras Reservoir Expansion Concept
(Water Quality and Supply Reliability Scenario)

Comparison of ACWD Baseline HAA5 with Calaveras (Water Quality Operation) HAA5 (WTP 2)

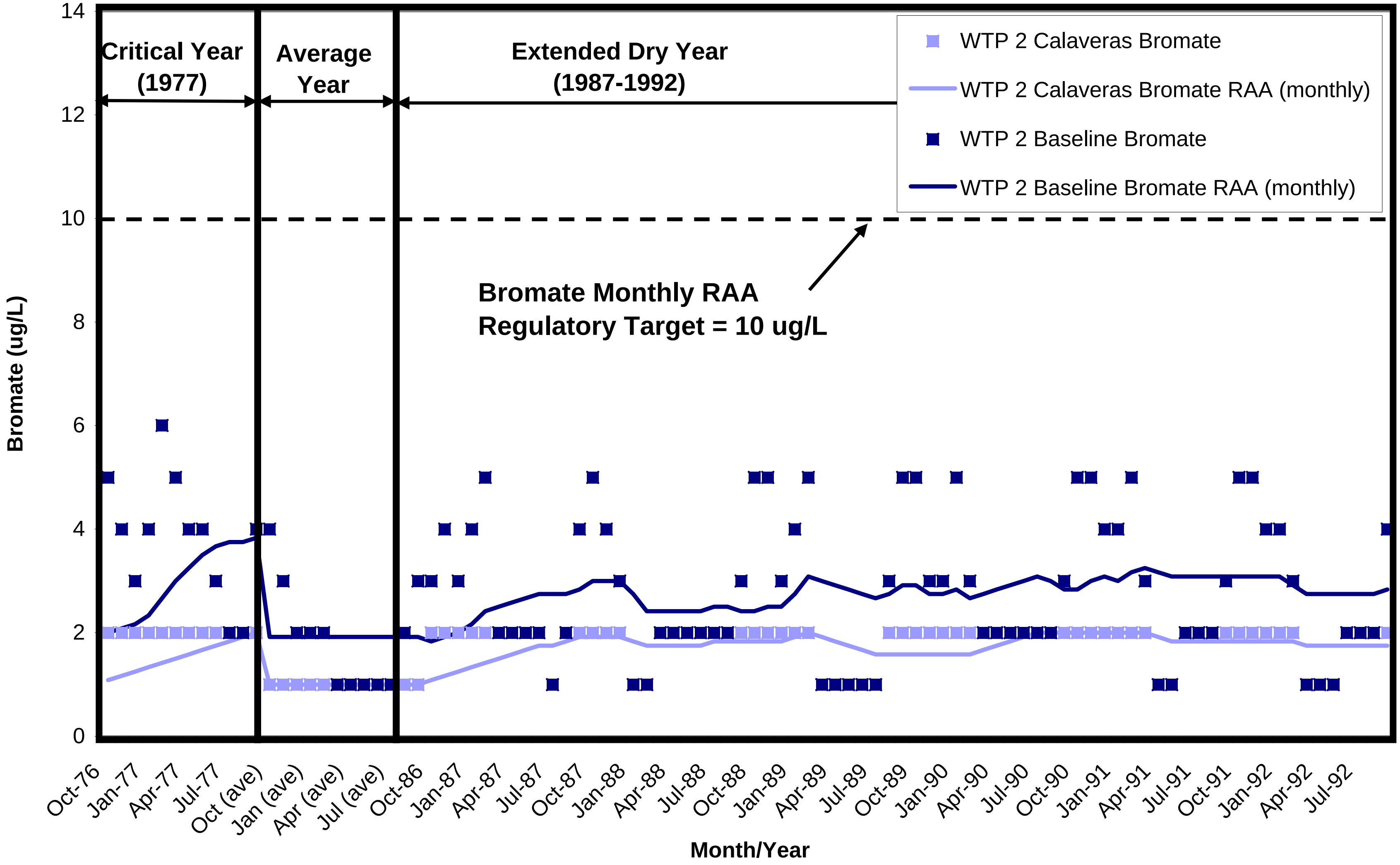


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for WTP 2.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

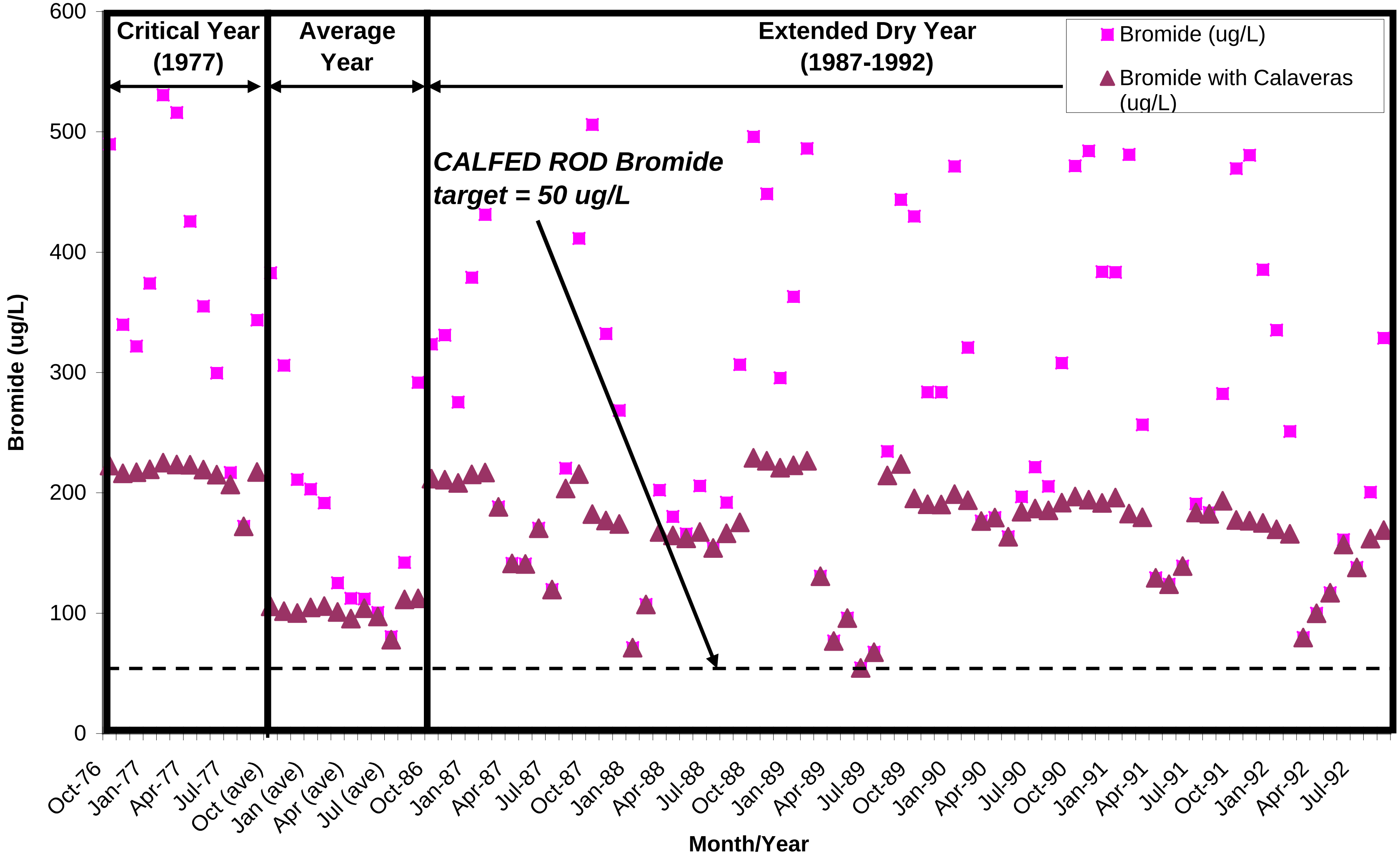
Comparison of ACWD Baseline Bromate with Calaveras (Water Quality Operation) Concept Bromate (WTP 2)



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for WTP 2.

Calaveras Reservoir Expansion Concept
(Water Quality and Supply Reliability Scenario)

Comparison of SCVWD Source Water Bromide with Calaveras (Water Quality Operation) Concept Bromide

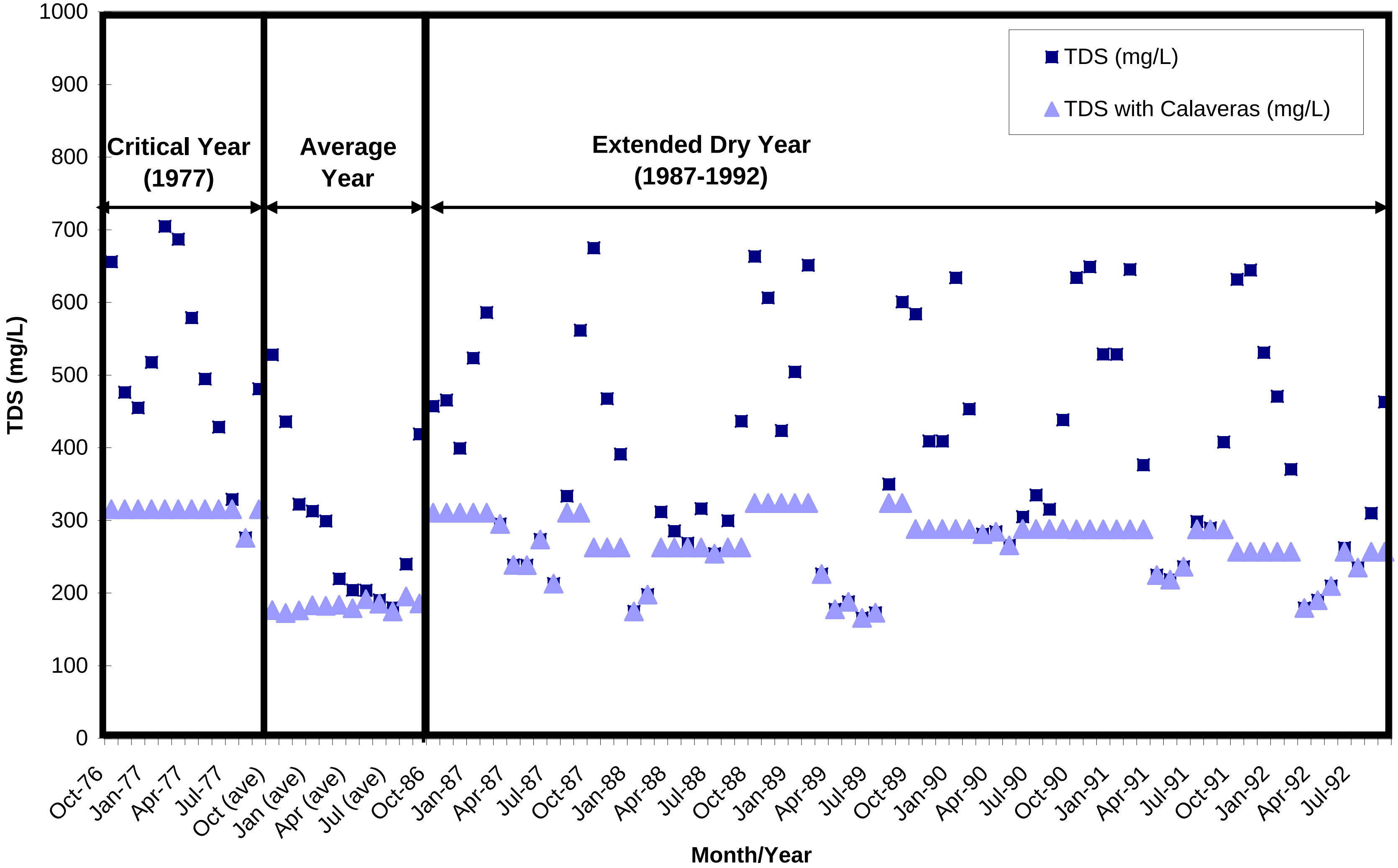


NNote: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of SCVWD Source Water TDS with Calaveras (Water Quality Operation) Concept TDS

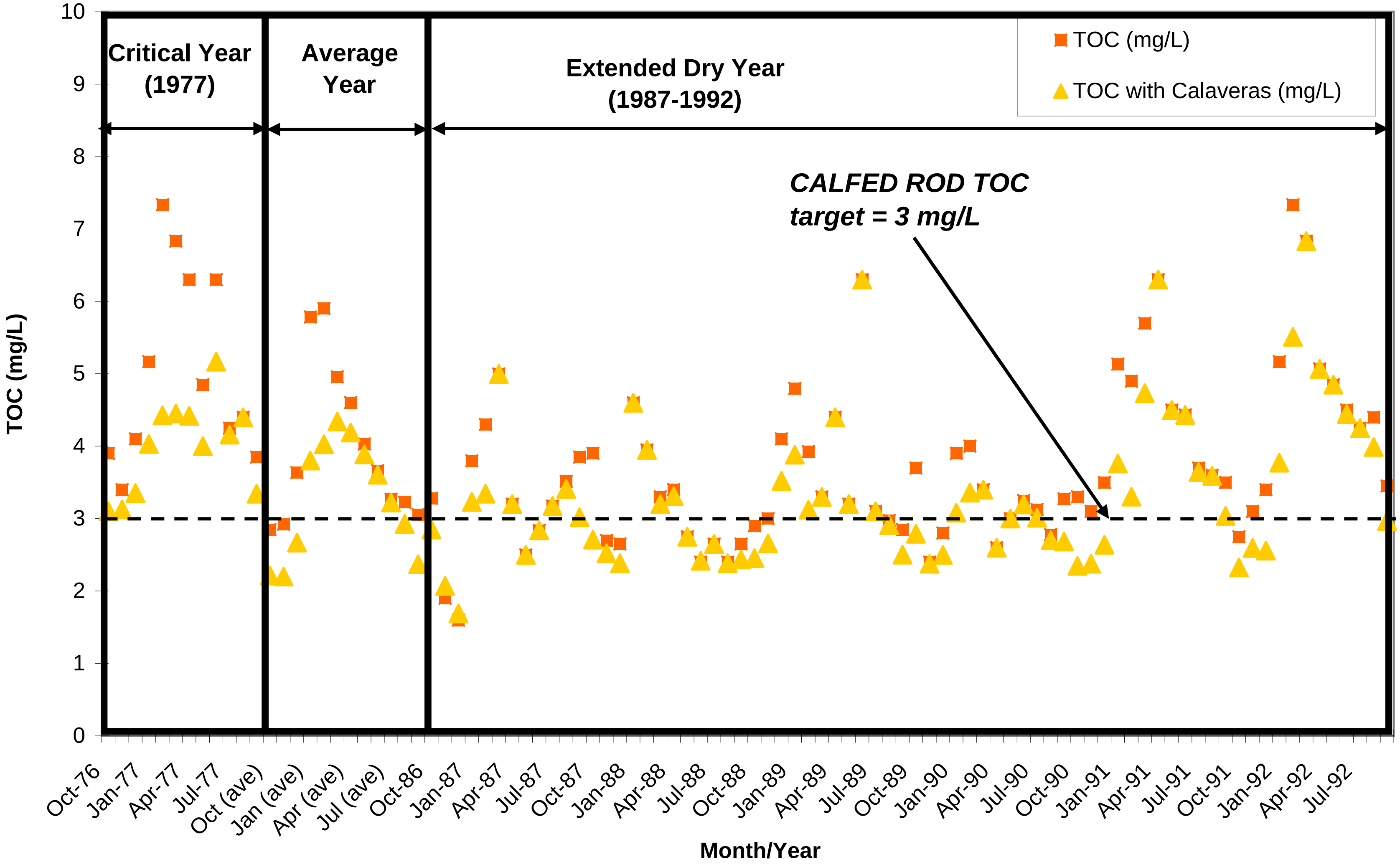


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

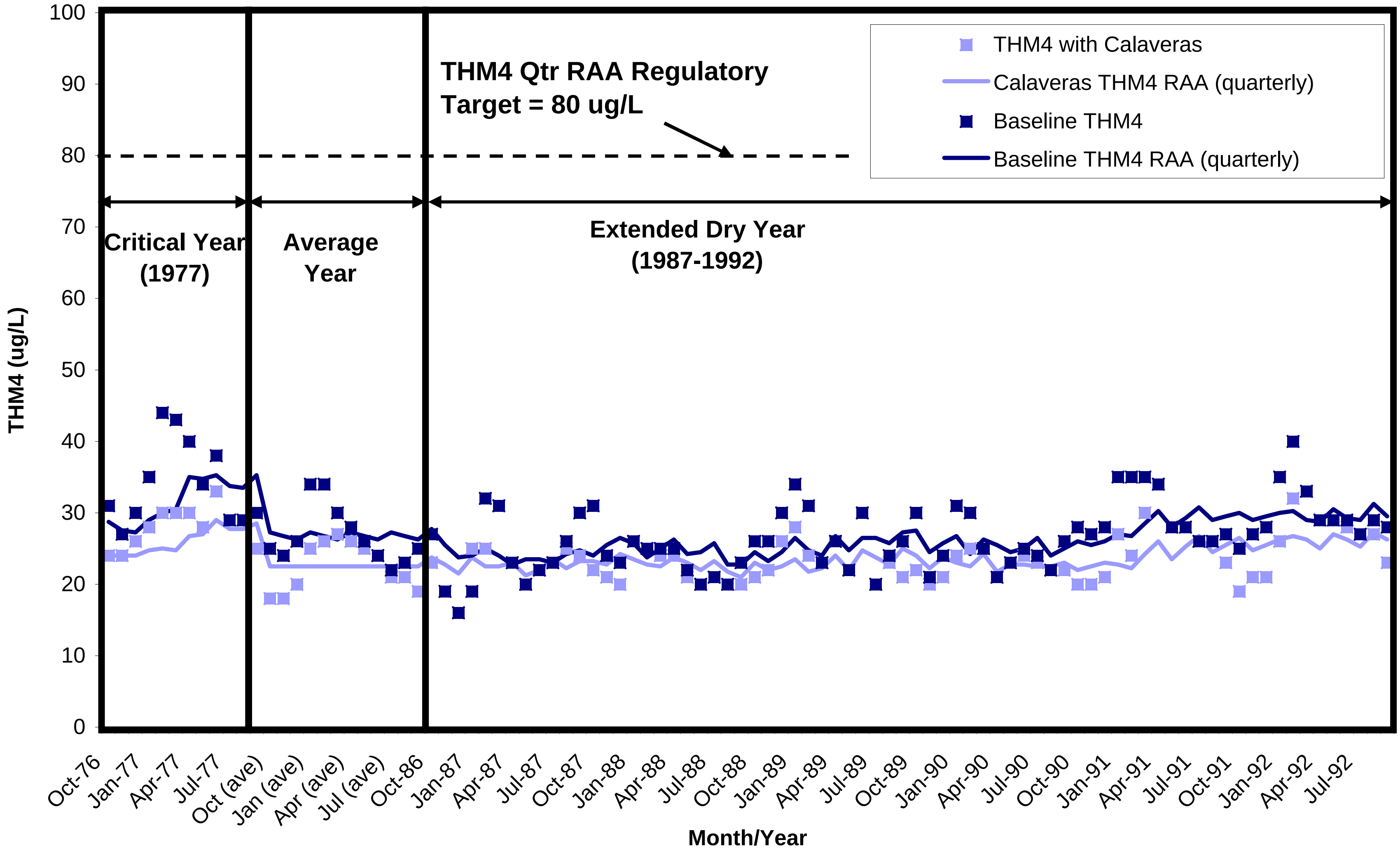
Comparison of SCVWD Source Water TOC with Calaveras (Water Quality Operation) Concept TOC



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept
(Water Quality and Supply Reliability Scenario)

Comparison of SCVWD Baseline THM4 with Calaveras (Water Quality Operation) Concept THM4

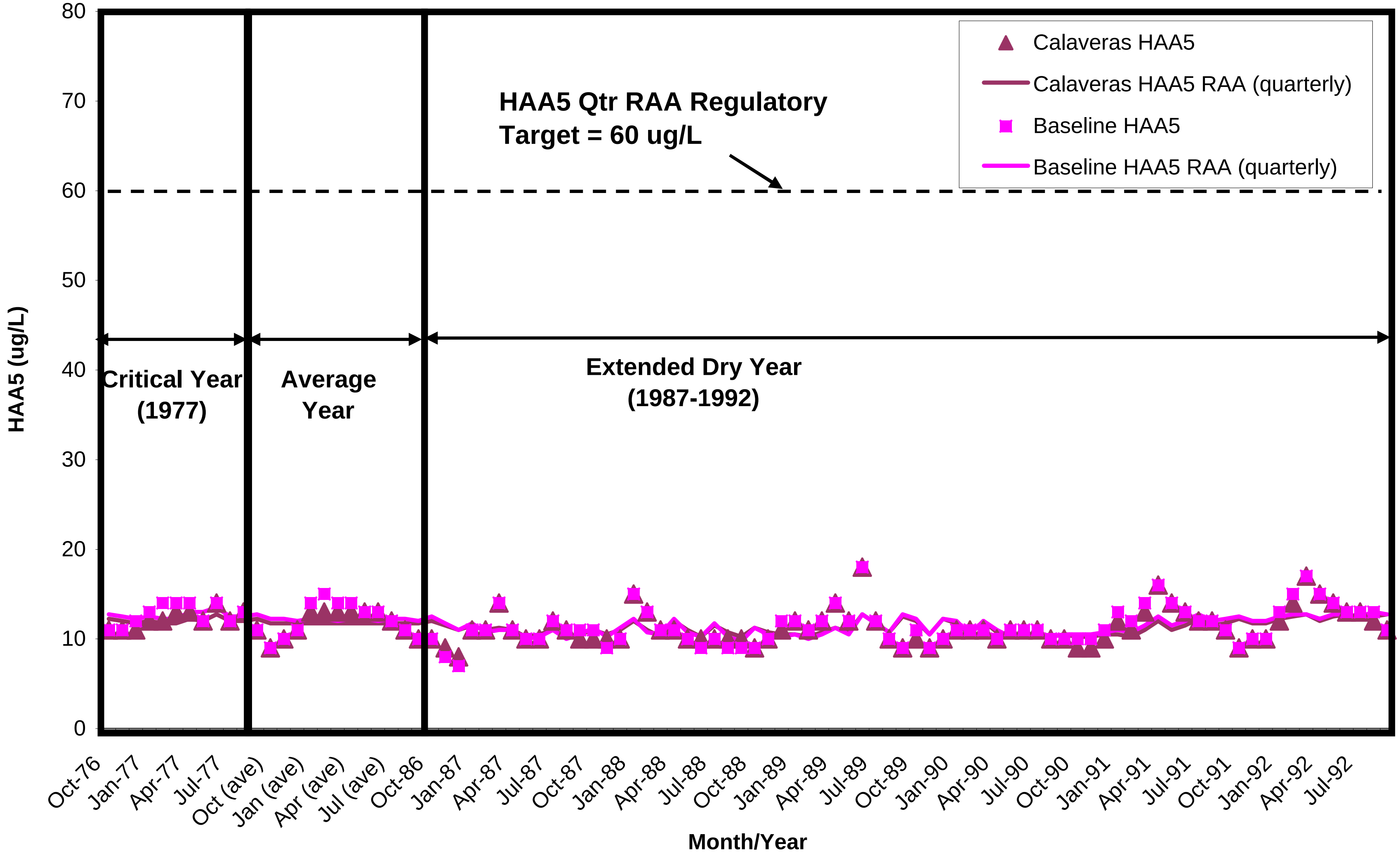


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of SCVWD Baseline HAA5 with Calaveras (Water Quality Operation) HAA5

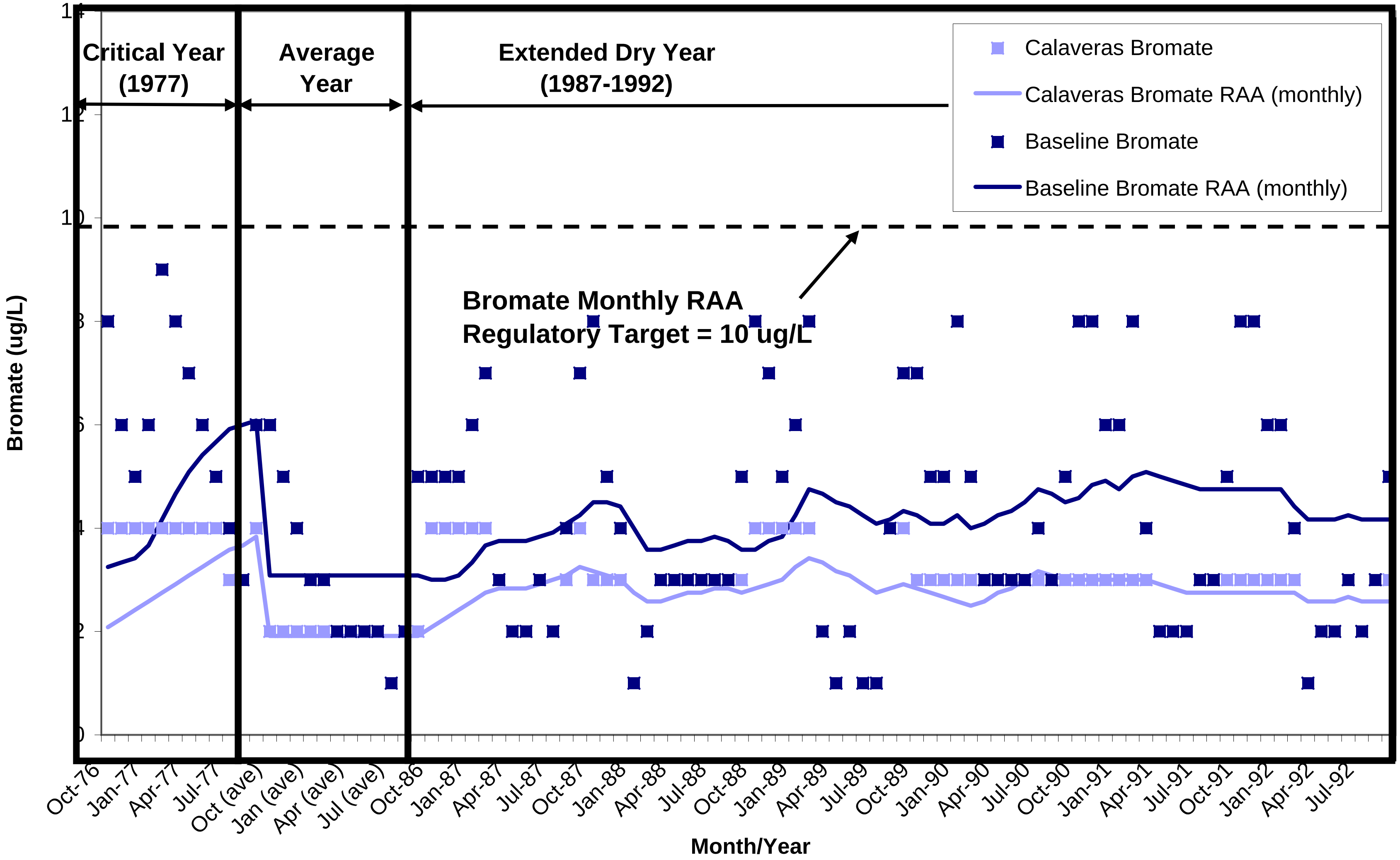


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

Calaveras Reservoir Expansion Concept

(Water Quality and Supply Reliability Scenario)

Comparison of SCVWD Baseline Bromate with Calaveras (Water Quality Operation) Concept Bromate



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

G2 Calaveras Reservoir Expansion – Maximize Supply

G2 Calaveras Reservoir Expansion – Maximize Water Supply Concept

DESCRIPTION

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 acre-feet (AF) to 420,000 AF[1].

In the Maximize Water Supply operating scenario, the additional storage of 323,000 AF (420,000 AF less 97,000 AF) is kept full the majority of the time, operating only the 97,000 AF to provide SFPUC's existing local supply needs. The additional capacity could then provide additional dry year supply reliability for potential partners, and would require use of the Hetch Hetchy system or another source of supply to initially fill the expanded storage, and re-fill it following a drought. This additional stored water could be conveyed to meet SFPUC (including San Francisco retail and BAWSCA customers) demands through the existing SFPUC transmission facilities. Flows could also be conveyed to the SCVWD/SFPUC common customers, through SFPUC deliveries or additional SCVWD needs through the existing emergency connection between SFPUC and SCVWD. Another alternative for delivery would be to transfer these flows into the South Bay Aqueduct in the Sunol Valley. This alternative would also provide dry year water quality improvements for ACWD and SCVWD.

Calaveras Expansion – Maximize Water Supply

Extended Dry Year Supply....................................53,000 AFY

Average Year Water Quality Supply..............................0 AFY

Cost
Capital Cost ....$426M (2003 dollars)
O&M Cost .... $3.5M/Yr (2003 dollars)
Unit Cost..TBD in future studies

Potential Owning Agency
SFPUC

Potential Partners
SCVWD, SFPUC(1), ACWD, BAWSCA

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

For this concept, up to 53,000 AFY is available for dry-year deliveries. No attempt was made in this study to allocate supply amongst potential partners. For the scorecard, supply and water quality benefits were calculated based on the maximum potential deliveries to each potential partner. Therefore, benefits shown represent the maximum possible benefits available from the concept for each agency. Actual benefits would be less, if the available supply is allocated amongst participating partners.

Potential Partner and Supply Amounts

Type of Benefit	Potential Amount (AFY)	Notes/Issues
ACWD		
Dry Year Supply Dry Year Water Quality	Up to 53,000 AFY	Up to 53,000 AFY is available for dry-year water deliveries. Some or all of this water could be transferred to the SBA downstream of Zone 7 in dry years.
SCVWD		
Dry Year Supply Dry Year Water Quality	Up to 53,000 AFY	Up to 53,000 AFY is available for dry-year water deliveries. Some or all of this water could be transferred to the SBA downstream of Zone 7 in dry years.
SFPUC[1]		
Dry Year Supply	Up to 53,000 AFY	Up to 53,000 AFY is available for dry-year water deliveries. Some or all of this water could be delivered to the SFPUC retail and wholesale system in dry years.

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

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[1] SFPUC is currently planning to restore the Calaveras Reservoir to its existing 97,000 AF capacity as part of its Capital Improvement Program.

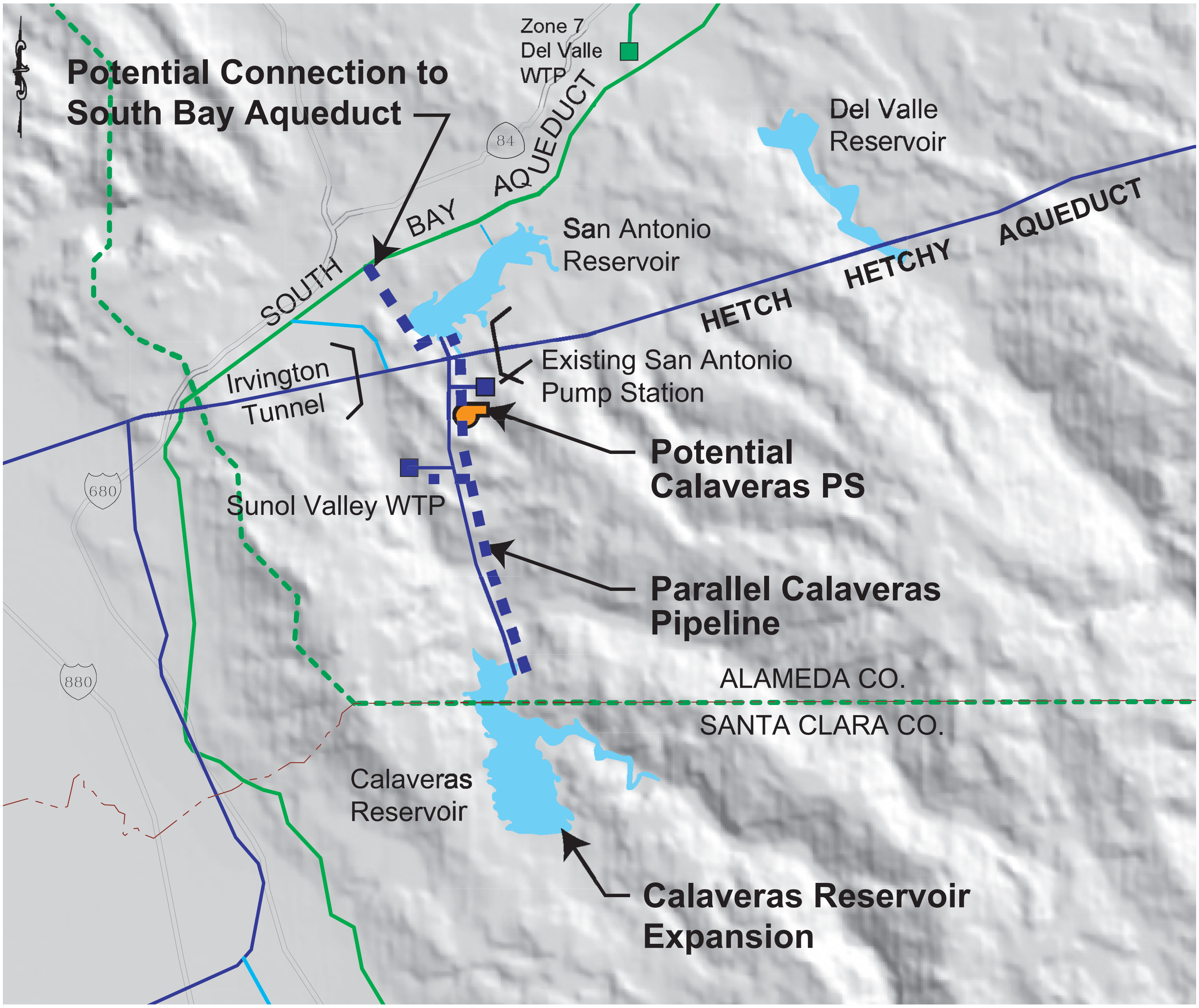


Figure G2-1
Calaveras Reservoir Expansion
420,000 Acre-Feet

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Table G2-1 - Supply Reliability Score Card

Performance Objective/Subobjective	Agency Baseline		Calaveras Reservoir Expansion Concept		Agency Baseline Plus Calaveras Reservoir Expansion Concept		Notes/Other
	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	
Meet Demand^1	Compares supply from concept with baseline supply						
Critical Drought							Results reported for maximize water supply operation of a 420,000 AF expanded reservoir, for 53,000 AFY yield delivered in dry years either to the SFPUC retail and wholesale system, or to ACWD and SCVWD through interconnections with the SFPUC system and/or directly into the SBA downstream of Zone 7. No attempt has been made to allocate supplies. This would need to be evaluated as part of future studies.
ACWD Supply (SWP)	20,600	AFY	Up to 53,000	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply^1	137,800	AFY	Up to 53,000	AFY	Up to 190,800	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	39,400	AFY	Up to 53,000	AFY	Up to 92,400	AFY	
SFPUC Supply	157,000	AFY	Up to 53,000	AFY	Up to 210,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply^2	217,000	AFY	Up to 53,000	AFY	Up to 270,000	AFY	
Extended Drought							
ACWD Supply (SWP)	25,500	AFY	Up to 53,000	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply^1	209,900	AFY	Up to 53,000	AFY	Up to 262,900	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	63,000	AFY	Up to 53,000	AFY	Up to 97,800	AFY	
SFPUC Supply	255,000	AFY	Up to 53,000	AFY	Up to 308,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply^2	343,500	AFY	Up to 53,000	AFY	Up to 396,500	AFY	
Average Year (1984)							
ACWD Supply (SWP)	42,700	AFY	0	AFY	42,700	AFY	
BAWSCA Agencies' Supply^1	345,000	AFY	0	AFY	345,000	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	97,800	AFY	0	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	0	AFY	329,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply^2	469,500	AFY	0	AFY	469,500	AFY	
Vulnerability							
ACWD	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - The Calaveras Reservoir expansion reduces vulnerability of ACWD and SCVWD to potential Delta water quality problems. The expansions also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
BAWSCA^1	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - Reduction in vulnerability resulting from reduced vulnerability of SCVWD and SFPUC systems.				
CCWD	N/A		N/A				
SCVWD	SBA contractors susceptible to water quality problems in the Delta, including potential Delta levee failures during a major seismic event.		Reduces Vulnerability - Calaveras Reservoir expansion reduces vulnerability of ACWD and SCVWD to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
EBMUD	N/A		N/A				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		Reduces Vulnerability - Provides additional supply flexibility for maintenance outages or water quality events in Hetch Hetchy Aqueduct supply. Reduces vulnerability to sesmic events on Calaveras fault.				
Zone 7	N/A		N/A				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - The project would be locally controlled.							

1. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.

2. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

Table G2-2 - Public Health Protection Scorecard

Concept: Calaveras Reservoir Expansion [1]

Performance Measure/Objective	Concept		Baseline Plus Concept		Notes
	Calaveras Reservoir Expansion Source Water	Calaveras Reservoir Expansion Treated Water	Calaveras Reservoir Expansion Source Water	Calaveras Reservoir Expansion Treated Water	
Variability for Treatment					
ACWD	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
BAWSCA Agencies[2]	NA	NA	NA	NA	BAWSCA Agencies receive treated supplies.
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
SFPUC	NA	NA	No Effect on Variability for Treatment	NA	Minimal change in source water quality
Zone 7	NA	NA	NA	NA	
Total Dissolved Solids					
ACWD	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
BAWSCA Agencies[2]	NA	NA	Reduces TDS	NA	Reduction in TDS with respect to SBA supply, minimal effect with respect to SFPUC supply
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
SFPUC	NA	NA	No Effect on TDS	NA	Minimal change in source water TDS
Zone 7	NA	NA	NA	NA	
Disinfection By-Products					
ACWD	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
BAWSCA Agencies[2]	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
SFPUC	NA	NA	NA	No Effect on DBPs	Minimal change in delivered water quality
Zone 7	NA	NA	NA	NA	
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	NA	NA	Improves T&O	Improvement in source water quality
BAWSCA Agencies[2]	NA	NA	NA	Improves T&O	Improvement in overall water quality
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	NA	Improves T&O	Improvement in source water quality
SFPUC	NA	NA	NA	No effect on T&O	Minimal change in delivered water quality
Zone 7	NA	NA	NA	NA	
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
BAWSCA Agencies[2]	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
SFPUC	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
Zone 7	NA	NA	NA	NA	
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
BAWSCA Agencies[2]	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	
CCWD	NA	NA	NA	NA	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	
SFPUC	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	
Zone 7	NA	NA	NA	NA	

1. Water quality evaluations for ACWD and SCVWD address water quality benefits resulting from blending Calaveras and SBA supplies.
2. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

Table G2-2a - Public Health Protection Score Card by Agency
Agency: ACWD[1]

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline: ACWD Source Water (SWP)	Agency Baseline: ACWD Treated Water (MSJWTP)	Agency Baseline: ACWD Treated Water (WTP 2)	Concept: Calaveras Expansion Concept Source Water	Concept: Calaveras Expansion Concept Treated Water	Baseline Plus Concept: Calaveras Expansion plus Agency Baseline Source Water	Baseline Plus Concept: Calaveras Expansion plus Agency Baseline Treated Water (MSJWTP)	Baseline Plus Concept: Calaveras Expansion plus Agency Baseline Treated Water (WTP 2)	Notes
Supply Quantity											
Critical Year		AFY	20,600			53,000		42,700			
Extended Dry Year		AFY	25,500			53,000		42,700			
Average Year		AFY	42,700			0		42,700			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	NA	0.17 - 0.20	0.12 - 0.15	0.15 - 0.18	
	Mean	mg/L	0.37	0.28	0.33	NA	NA	0.19	0.14	0.17	
TOC	Range	mg/L	3.4 - 7.3	2.9 - 6.4	2.3 - 5.5	NA	NA	3.0 - 4.9	2.5 - 4.2	2.0 - 3.5	
	Mean	mg/L	5.1	4.4	3.7	NA	NA	3.8	3.3	2.7	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.413	0.04 - 0.47	NA	NA	0.05 - 0.20	0.03 - 0.15	0.04 - 0.27	
	Mean	mg/L	0.26	0.20	0.23	NA	NA	0.16	0.11	0.14	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	NA	NA	1.7 - 6.8	1.4 - 6.0	1.0 - 5.1	
	Mean	mg/L	3.7	3.17	2.6	NA	NA	3.3	2.8	2.3	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	NA	NA	NA	NA	
	Mean	mg/L	0.19	0.14	0.17	NA	NA	NA	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	NA	NA	NA	NA	
	Mean	mg/L	3.99	3.43	2.8	NA	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	NA	
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	NA	
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	NA	276 - 286	298 - 308	307 - 317	
	Mean	mg/L	507	529	561	NA	NA	285	307	316	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	NA	166 - 293	188 - 315	197 - 324	
	Mean	mg/L	384	406	438	NA	NA	249	272	281	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	NA	NA	NA	NA	
	Mean	mg/L	296	319	350	NA	NA	NA	NA	NA	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	2 - 6	NA	NA	NA	ND - ND	2 - 2	
	Mean	ug/L	NA	ND	4	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	82 - 153	26 - 42	NA	NA	NA	70 - 101	23 - 30	
	Mean	ug/L	NA	110	33	NA	NA	NA	84	26	
HAA5	Range	ug/L	NA	47 - 75	16 - 21	NA	NA	NA	46 - 65	16 - 20	
	Mean	ug/L	NA	61	19	NA	NA	NA	55	18	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 5	NA	NA	NA	ND - ND	1 - 14	
	Mean	ug/L	NA	ND	3	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	50 - 142	16 - 38	NA	NA	NA	48 - 119	17 - 32	
	Mean	ug/L	NA	83	26	NA	NA	NA	73	23	
HAA5	Range	ug/L	NA	22 - 92	11 - 26	NA	NA	NA	24 - 92	12 - 26	
	Mean	ug/L	NA	52	17	NA	NA	NA	50	17	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 4	NA	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	2	NA	NA	NA	NA	NA	
THM4	Range	ug/L	NA	68 - 116	21 - 33	NA	NA	NA	NA	NA	
	Mean	ug/L	NA	85	26	NA	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	41 - 74	14 - 22	NA	NA	NA	NA	NA	
	Mean	ug/L	NA	57	19	NA	NA	NA	NA	NA	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall quality	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

1. Water quality evaluations for ACWD address water quality benefits resulting from blending Calaveras and SBA supplies.

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

Table G2-2b - Public Health Protection Score Card by Agency
Agency: SFPUC

			Agency Baseline		**Concept**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SFPUC Source Water**	**SFPUC Treated Water**	**Calaveras Expansion Concept Source Water**	**Calaveras Expansion Concept Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	157,000		NA		210,000		
Extended Dry Year		AFY	255,000		NA		308,000		
Average Year		AFY	329,000		NA		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	NA	0.01 - 0.03	0.01 - 0.01	
	Mean	mg/L	0.02	0.01	NA	NA	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	NA	1.4 - 3.1	1.4 - 2.7	
	Mean	mg/L	2.0	1.9	NA	NA	2.0	1.9	
pH	Qual		somewhat variable	less variable	NA	NA	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	less variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	NA	0.01 - 0.04	0.01 - 0.03	
	Mean	mg/L	0.02	0.01	NA	NA	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	NA	1.4 - 3.4	1.4 - 3.0	
	Mean	mg/L	2.0	1.9	NA	NA	1.9	1.8	
pH	Qual		somewhat variable	less variable	NA	NA	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	less variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	NA	NA	NA	
	Mean	mg/L	0.01	0.01	NA	NA	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	NA	NA	NA	
	Mean	mg/L	1.7	1.6	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	NA	16 - 45	32 - 61	
	Mean	mg/L	26	26	NA	NA	31	47	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	NA	16 - 98	32 - 114	
	Mean	mg/L	42	42	NA	NA	39	55	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	NA	30 - 82	46 - 98	
	Mean	mg/L	40	40	NA	NA	52	68	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	NA	NA	ND	
THM4	Range	mg/L	NA	34 - 47	NA	NA	NA	30 - 39	
	Mean	mg/L	NA	38	NA	NA	NA	34	
HAA5	Range	mg/L	NA	28 - 40	NA	NA	NA	25 - 32	
	Mean	mg/L	NA	32	NA	NA	NA	29	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	NA	NA	ND	
THM4	Range	mg/L	NA	33 - 50	NA	NA	NA	30 - 43	
	Mean	mg/L	NA	38	NA	NA	NA	35	
HAA5	Range	mg/L	NA	24 - 44	NA	NA	NA	24 - 39	
	Mean	mg/L	NA	30	NA	NA	NA	28	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	NA	NA	ND	
THM4	Range	mg/L	NA	24 - 43	NA	NA	NA	24 - 44	
	Mean	mg/L	NA	33	NA	NA	NA	34	
HAA5	Range	mg/L	NA	22 - 34	NA	NA	NA	20 - 35	
	Mean	mg/L	NA	28	NA	NA	NA	27	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	No change	No change	Minimal change in water quality
Algal blooms	Qual		minimal	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Table G2-2c - Public Health Protection Score Card by Agency

Agency: SCVWD [1]

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline		Concept		Baseline Plus Concept		Notes
			SCVWD Source Water (SWP)	SCVWD Treated Water (SWP)	Calaveras Expansion Concept Source Water	Calaveras Expansion Concept Treated Water	Calaveras Expansion plus Agency Baseline Source Water	Calaveras Expansion plus Agency Baseline Treated Water	
Supply Quantity									
Critical Year		AFY	39,400		53,000		92,400		
Extended Dry Year		AFY	63,000		53,000		97,800		
Average Year		AFY	97,800		0		NA		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	NA	0.17 - 0.20	0.15 - 0.18	
	Mean	mg/L	0.37	0.33	NA	NA	0.19	0.17	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	NA	3.0 - 4.9	2.1 - 3.7	
	Mean	mg/L	5.1	3.9	NA	NA	3.8	2.8	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	NA	0.05 - 0.20	0.04 - 0.18	
	Mean	mg/L	0.26	0.24	NA	NA	0.16	0.14	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	NA	1.7 - 6.8	1.0 - 5.4	
	Mean	mg/L	3.7	2.7	NA	NA	3.3	2.4	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	NA	NA	NA	
	Mean	mg/L	0.19	0.17	NA	NA	NA	NA	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	NA	NA	NA	
	Mean	mg/L	4.0	3.0	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	NA	NA	NA	NA	
Temperature	Qual		variable	less variable	NA	NA	NA	NA	
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	NA	276 - 286	296 - 305	
	Mean	mg/L	507	527	NA	NA	285	305	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	NA	166 - 293	185 - 313	
	Mean	mg/L	384	404	NA	NA	249	269	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	NA	NA	NA	
	Mean	mg/L	296	316	NA	NA	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	NA	NA	3 - 3	
	Mean	mg/L	NA	6	NA	NA	NA	3	
THM4	Range	mg/L	NA	27 - 44	NA	NA	NA	23 - 31	
	Mean	mg/L	NA	34	NA	NA	NA	27	
HAA5	Range	mg/L	NA	11 - 14	NA	NA	NA	11 - 13	
	Mean	mg/L	NA	13	NA	NA	NA	12	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	NA	NA	1 - 3	
	Mean	mg/L	NA	4	NA	NA	NA	3	
THM4	Range	mg/L	NA	16 - 40	NA	NA	NA	16 - 34	
	Mean	mg/L	NA	27	NA	NA	NA	23	
HAA5	Range	mg/L	NA	7 - 18	NA	NA	NA	8 - 18	
	Mean	mg/L	NA	11	NA	NA	NA	11	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	NA	NA	NA	
	Mean	mg/L	NA	3	NA	NA	NA	NA	
THM4	Range	mg/L	NA	22 - 34	NA	NA	NA	NA	
	Mean	mg/L	NA	27	NA	NA	NA	NA	
HAA5	Range	mg/L	NA	9 - 15	NA	NA	NA	NA	
	Mean	mg/L	NA	12	NA	NA	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		moderate	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Water quality evaluations for SCVWD address water quality benefits resulting from blending Calaveras and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Table G2-3 - Cost, Environmental and Implementation Score Card

	Concept Rating	**Notes/Other**
Cost Impacts		
Total Cost		
Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing st
Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): High Impact.** Potential effects are primarily associated with aquatic and terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land and water resources. In addition, other facility development could also affect sensitive biological resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts in and around the watershed at a 3:1 ratio or at a ratio that is deemed appropriate by regulatory agencies.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits**. No benefits to the environmental are expected from the construction and operation of this concept prior to mitigation. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Protection, restoration, and enhancement of habitat for plants and wildlife species would be considered a benefit since the acreage protected, restored, or enhanced would likely exceed that affected by concept implementation.	
Implementation Potential		
External Support	TBD[1] - Historically, use of desalination, water recycling and enhanced conservation rather than storage concepts have been viewed as environmentally-friendly alternatives and generated more support than storage projects.	
Ability to Get Outside Funding	TBD[1]	
Consistency with Local and Regional Plans	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	3	ACWD, SCVWD, SFPUC (retail and wholesale customers)
Population Receiving Benefits	4,700,000 people	

1. To be determined in future studies.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Table G2-4 - Environmental Score Card

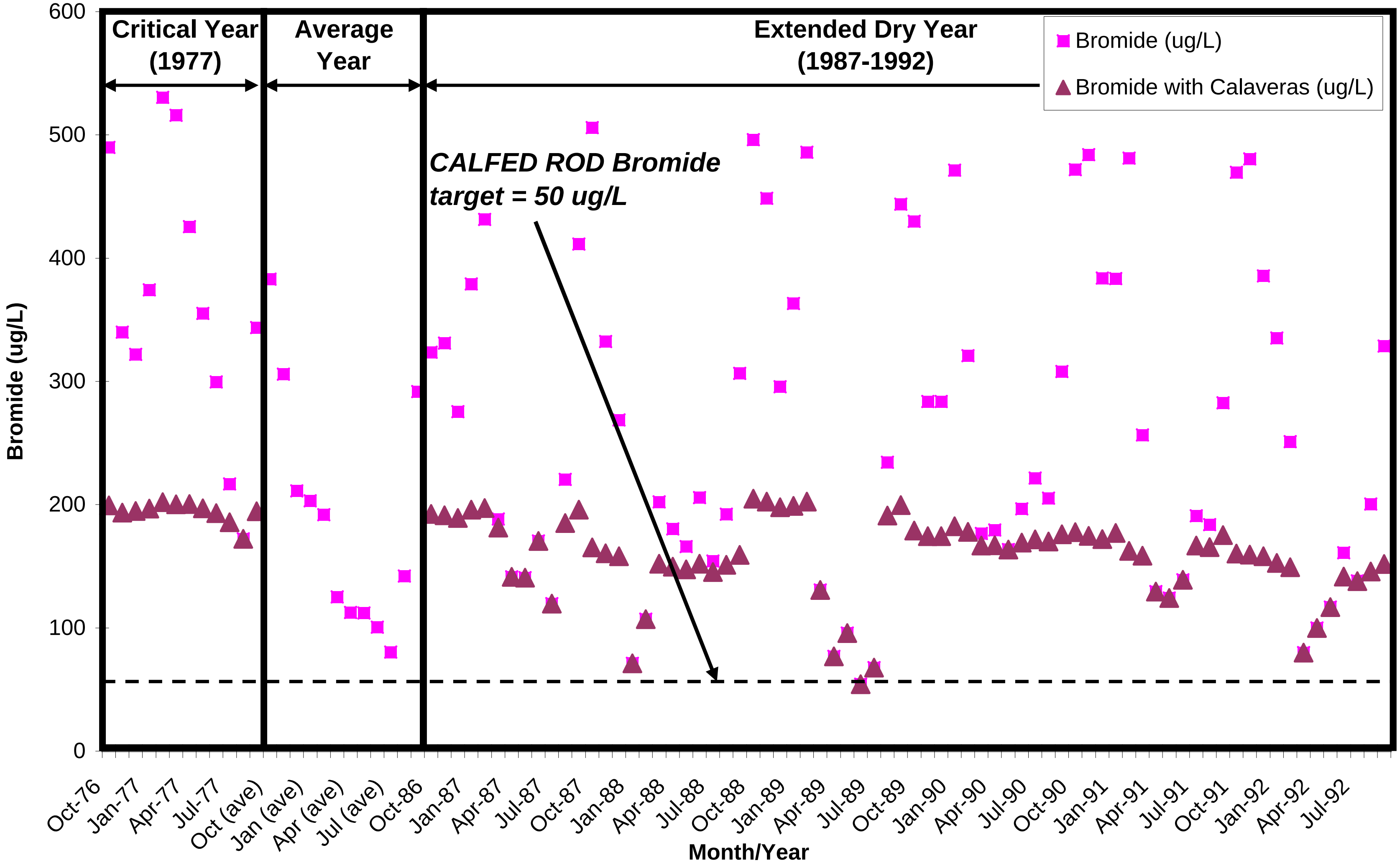
Performance Measure/Objective	Concept Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could then affect habitat for fish. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this would require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions). In addition, continue trout planting.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Direct effects from inundation of terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and an area of potential serpentine associated plants. Additional disturbed acreage associated with construction of other facilities (e.g., pipeline, pump station). **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed. In addition, consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Restoration of affected habitat may occur at a 3:1 ratio, or as negotiated with regulatory agencies.
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** Direct effects to marsh habitat from inundation. Siting of other permanent facilities and construction of conveyance facilities may also affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities would be similar to those described above for Terrestrial Environment. Affected lands would be restored at a ratio deemed appropriate by regulatory agencies.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply.
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** The energy requirement associated with concept operation is not known. Pollutant emissions would be associated with energy production.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	**Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** More information would be required to identify potential effects and mitigation opportunities.

1. To be determined in future studies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of ACWD Source Water Bromide with Calaveras (Water Supply Operation) Concept Bromide

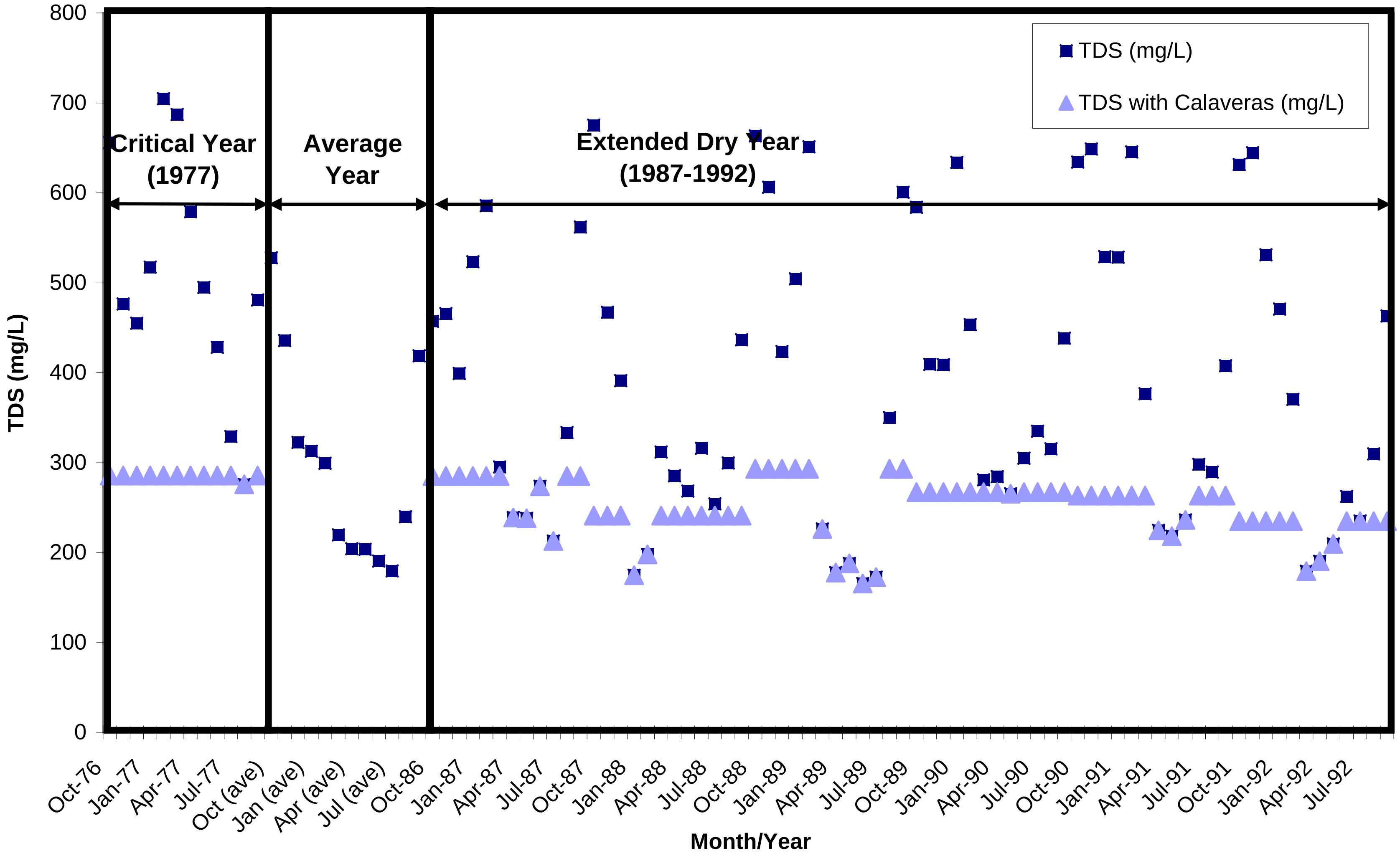


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of ACWD Source Water TDS with Calaveras (Water Supply Operation) Concept TDS

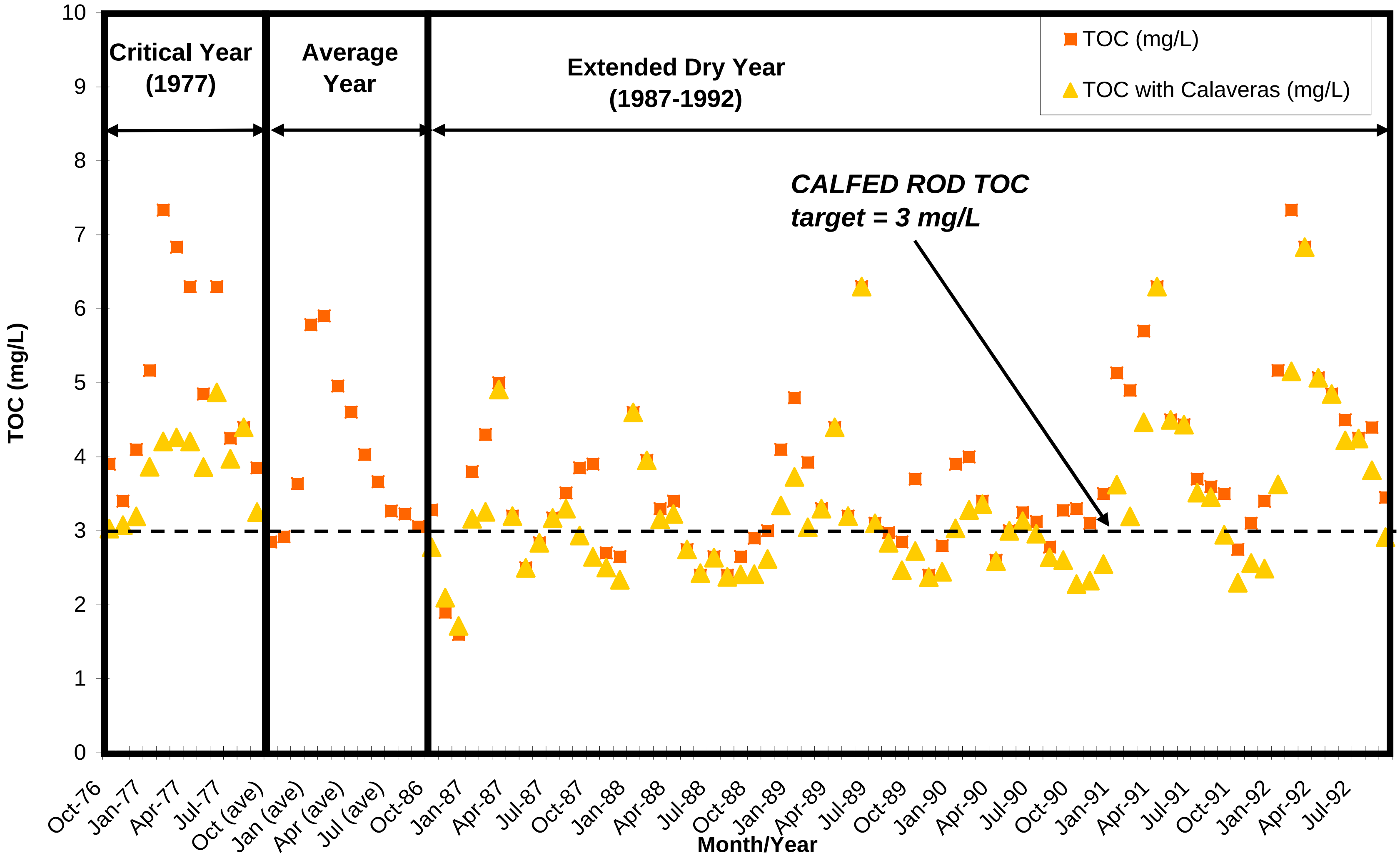


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of ACWD Source Water TOC with Calaveras (Water Supply Operation) Concept TOC

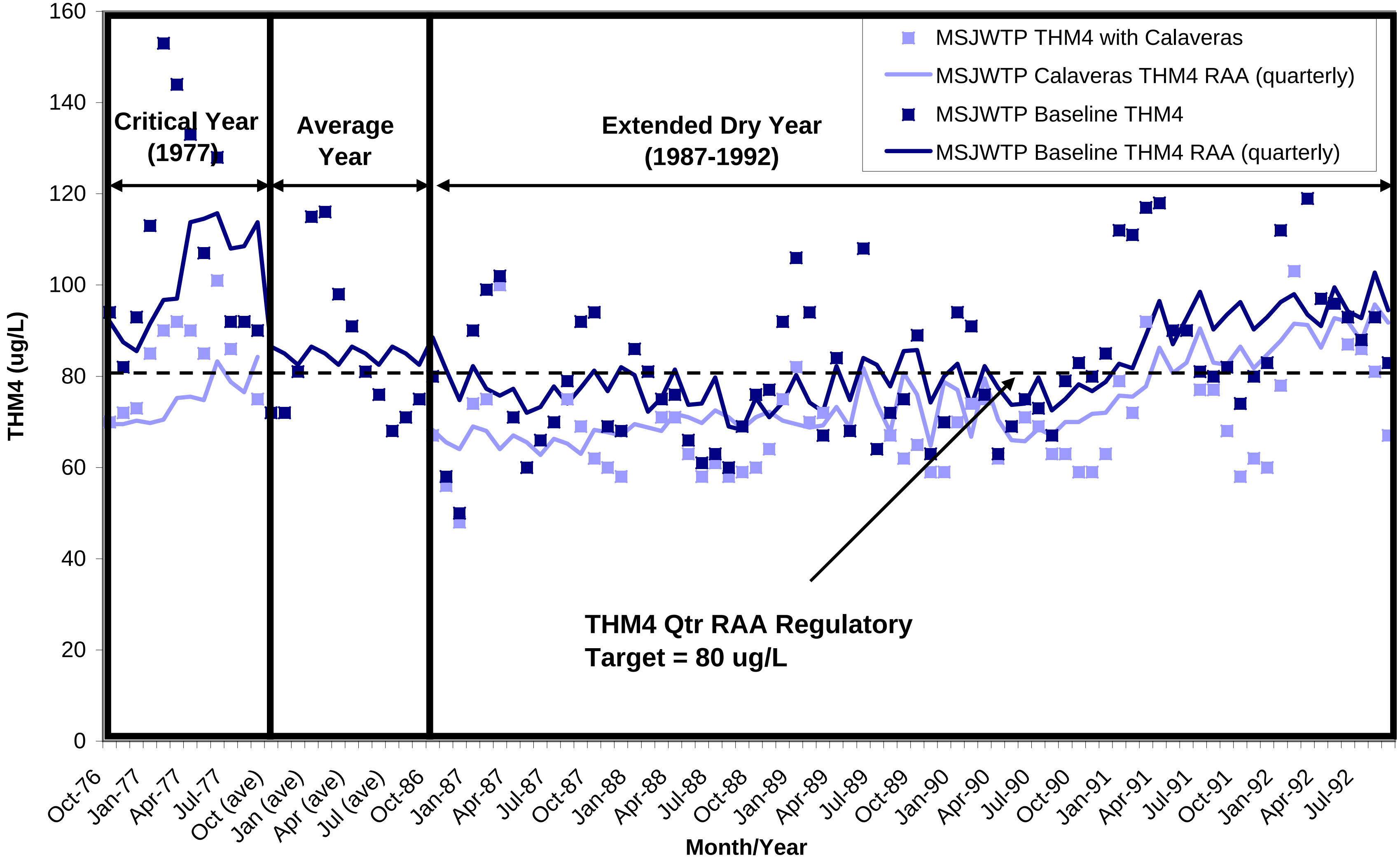


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of ACWD Baseline THM4 with Calaveras (Water Supply Operation) Concept THM4 (MSJWTP)

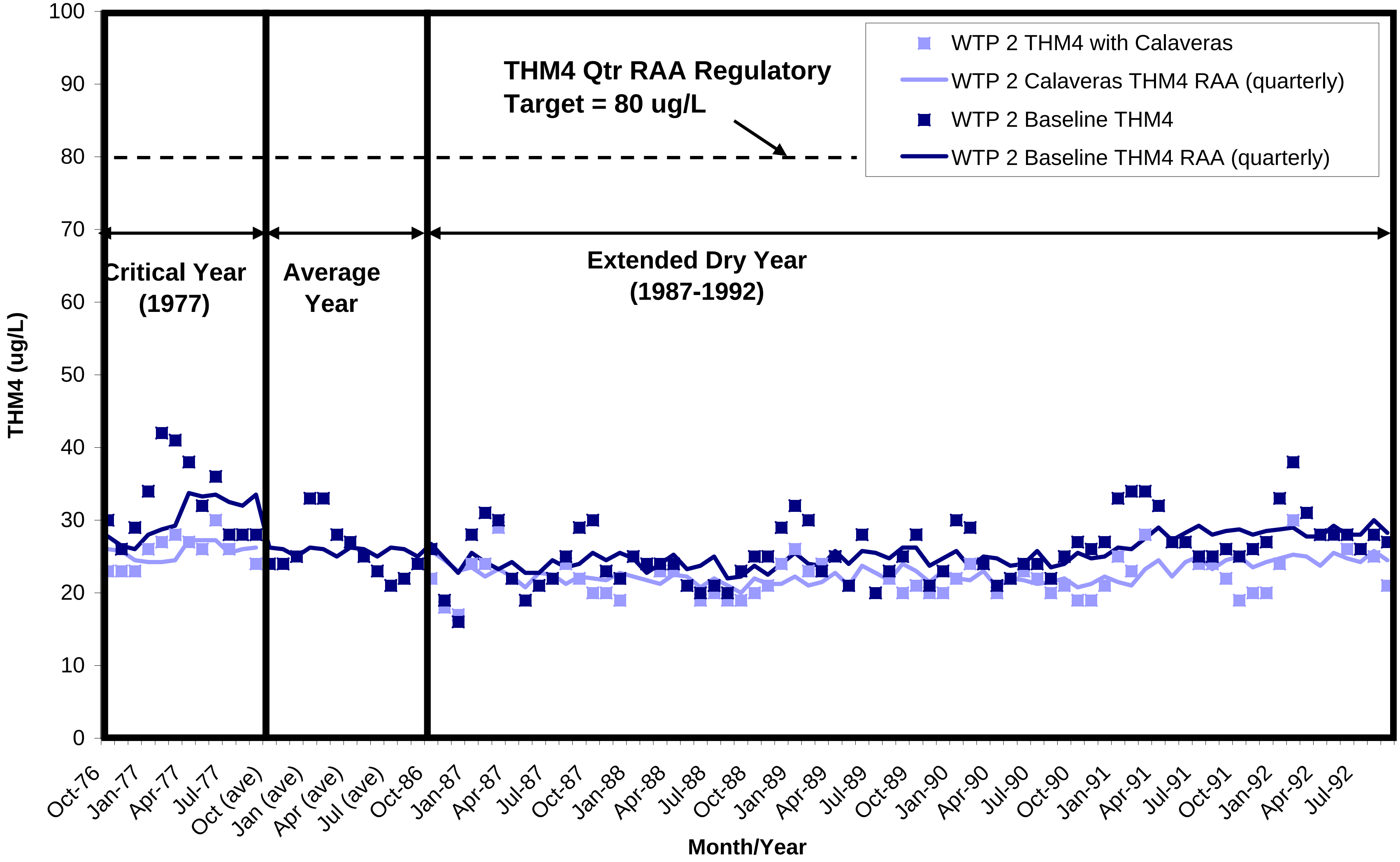


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for MSJWTP treatment.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of ACWD Baseline THM4 with Calaveras (Water Supply Operation) Concept THM4 (WTP 2)

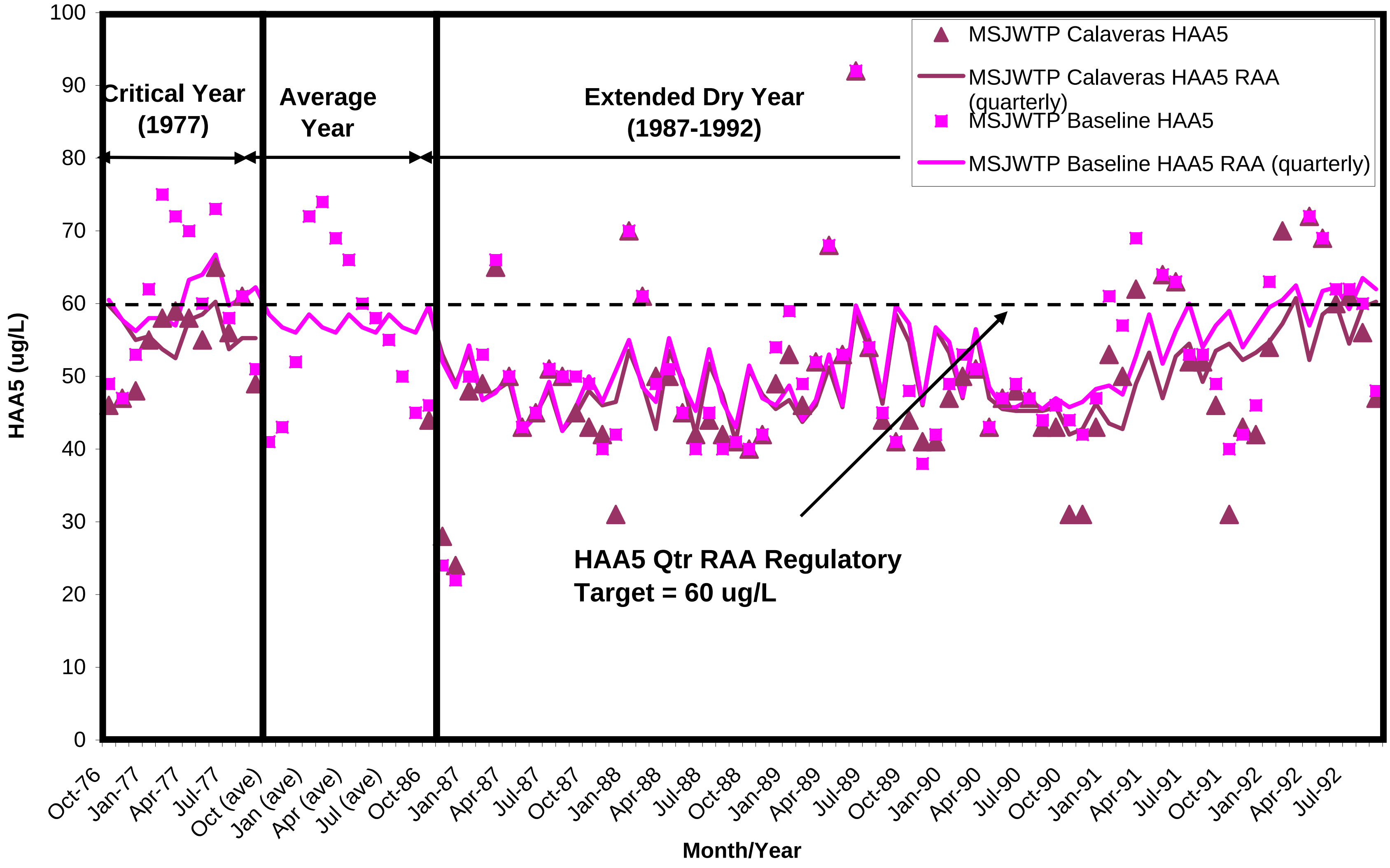


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for WTP 2 treatment.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

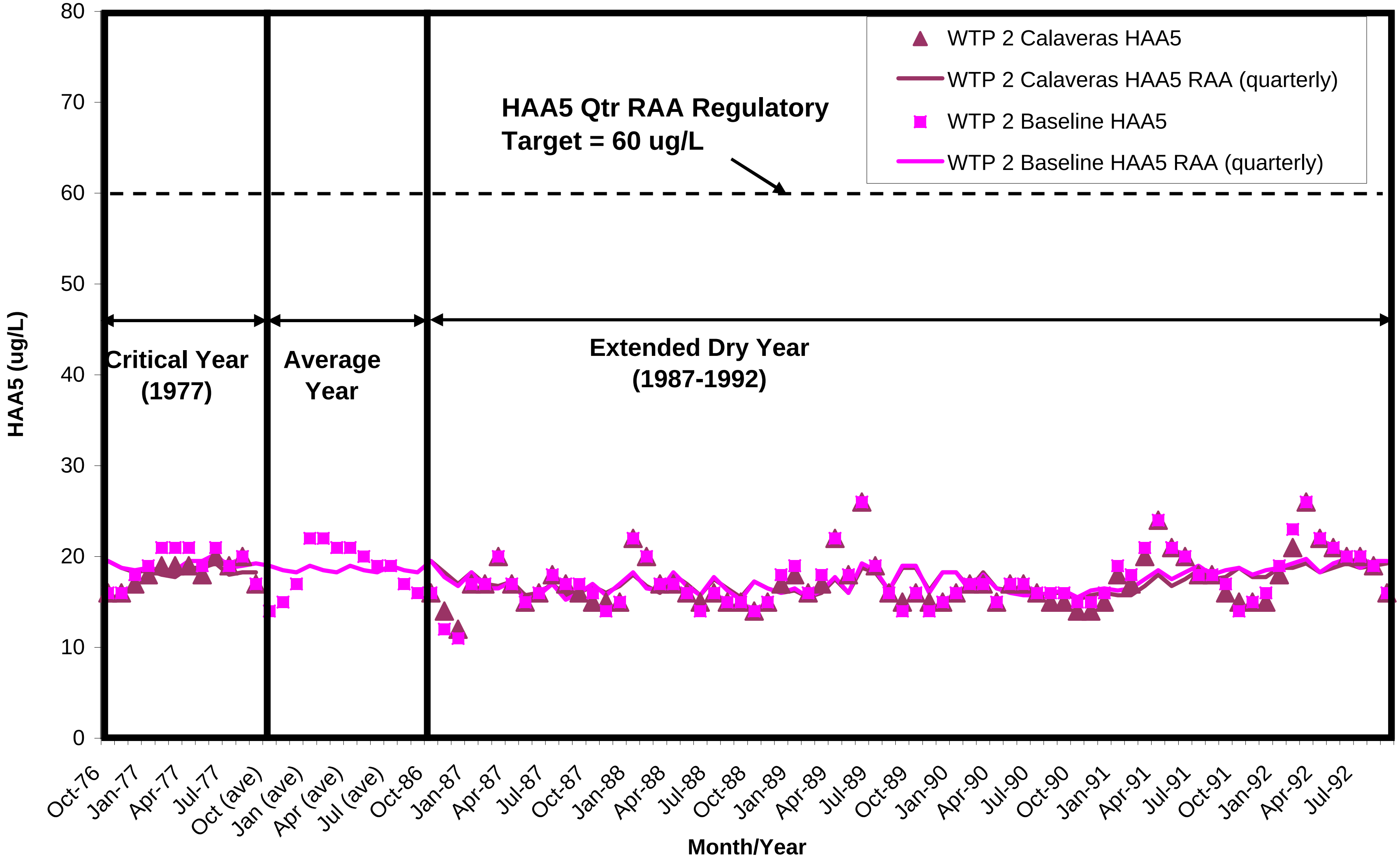
Comparison of ACWD Baseline HAA5 with Calaveras (Water Supply Operation) HAA5 (MSJWTP)



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for MSJWTP .

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

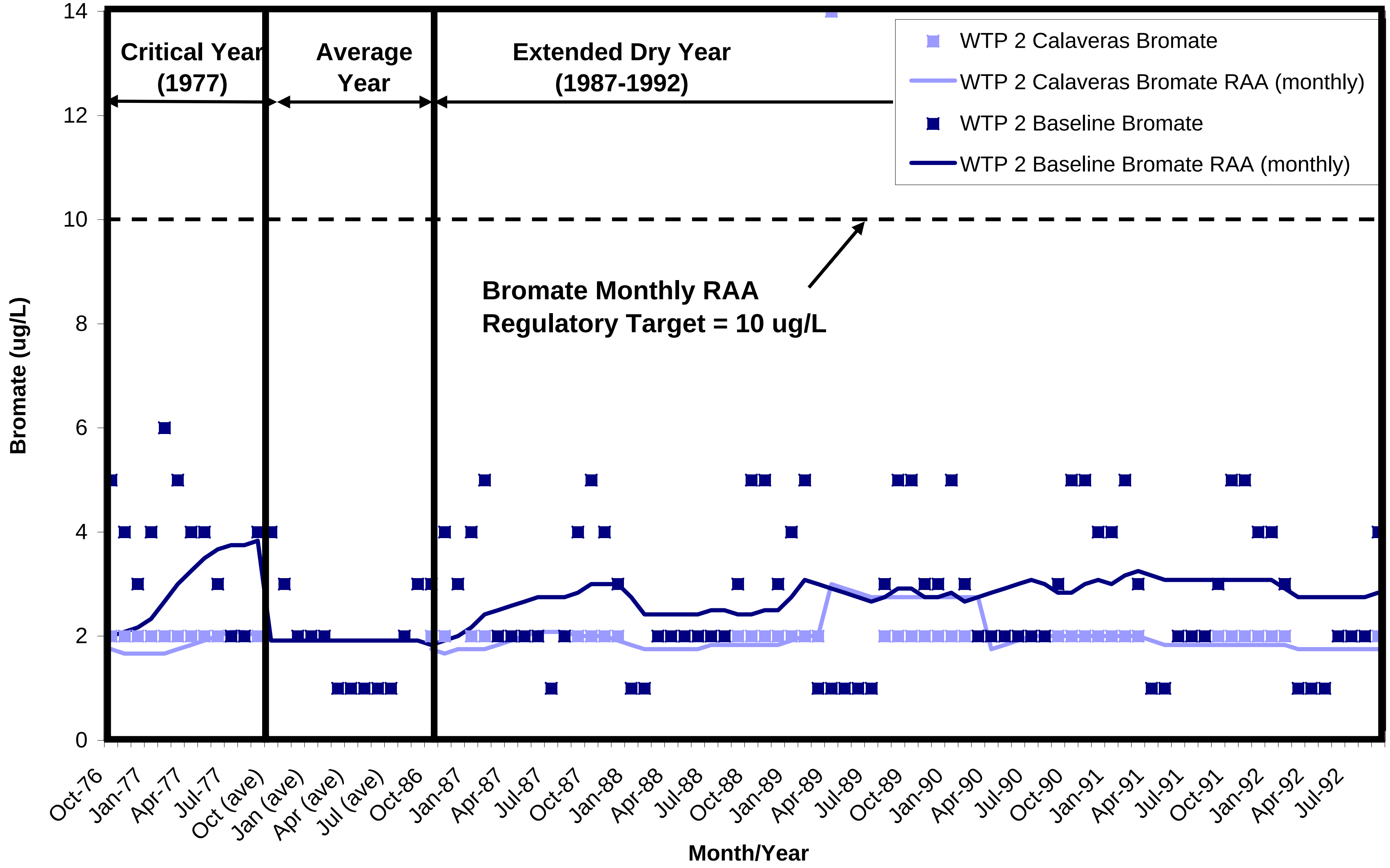
Comparison of ACWD Baseline HAA5 with Calaveras (Water Supply Operation) HAA5 (WTP 2)



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for WTP 2.

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

Comparison of ACWD Baseline Bromate with Calaveras (Water Supply Operation) Concept Bromate (WTP 2)

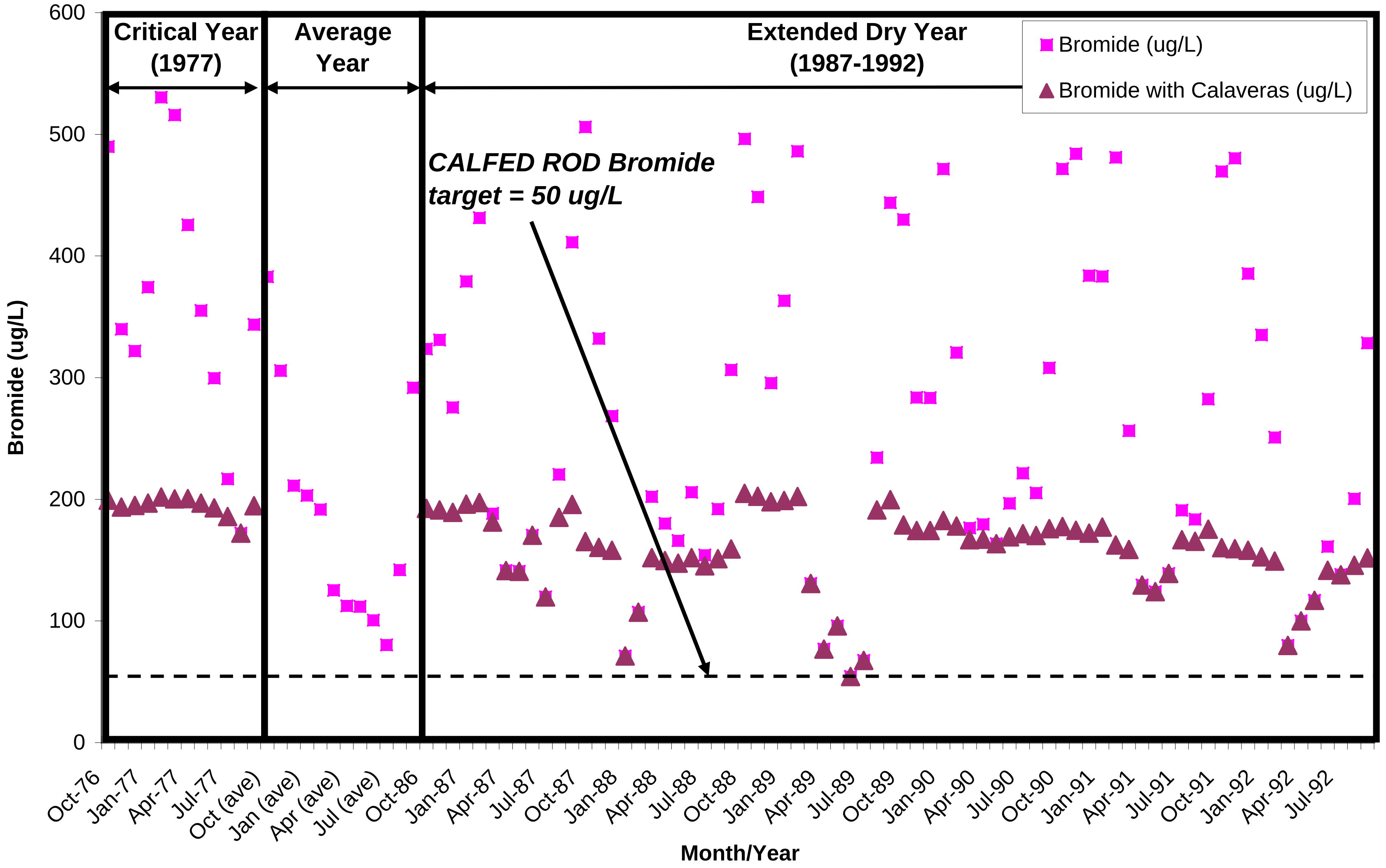


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production for WTP 2.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of SCVWD Source Water Bromide with Calaveras (Water Supply Operation) Concept Bromide

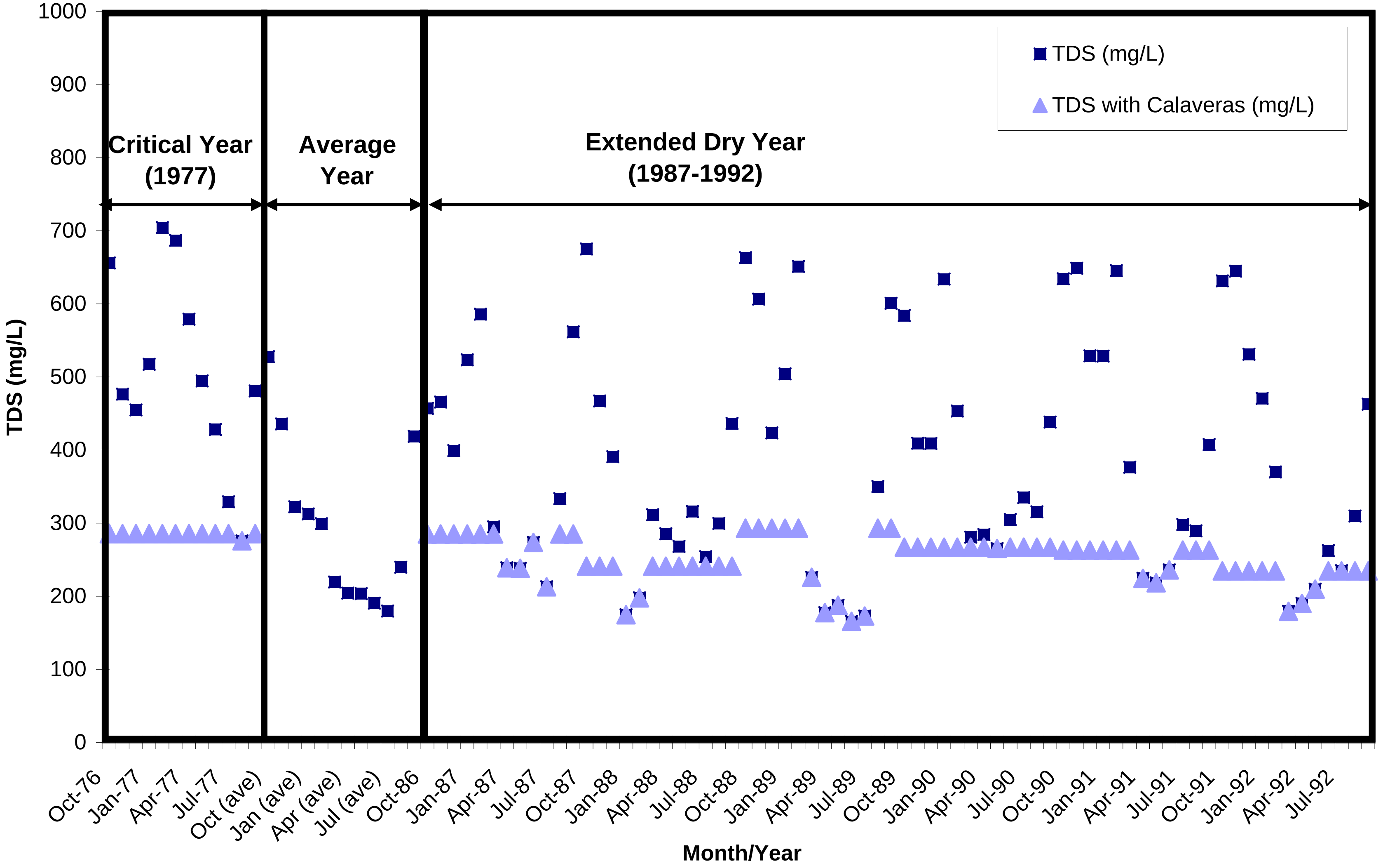


NNote: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of SCVWD Source Water TDS with Calaveras (Water Supply Operation) Concept TDS

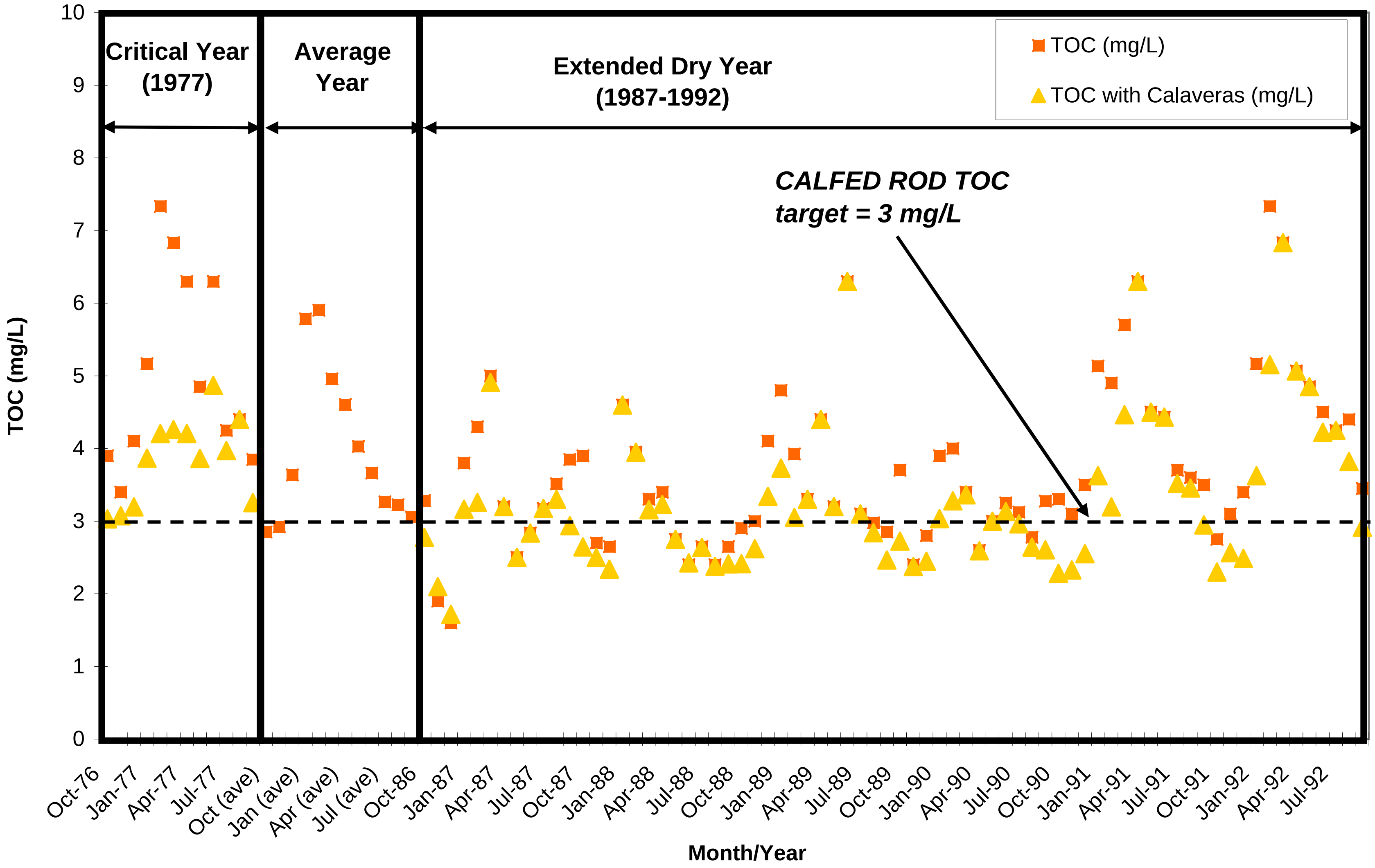


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

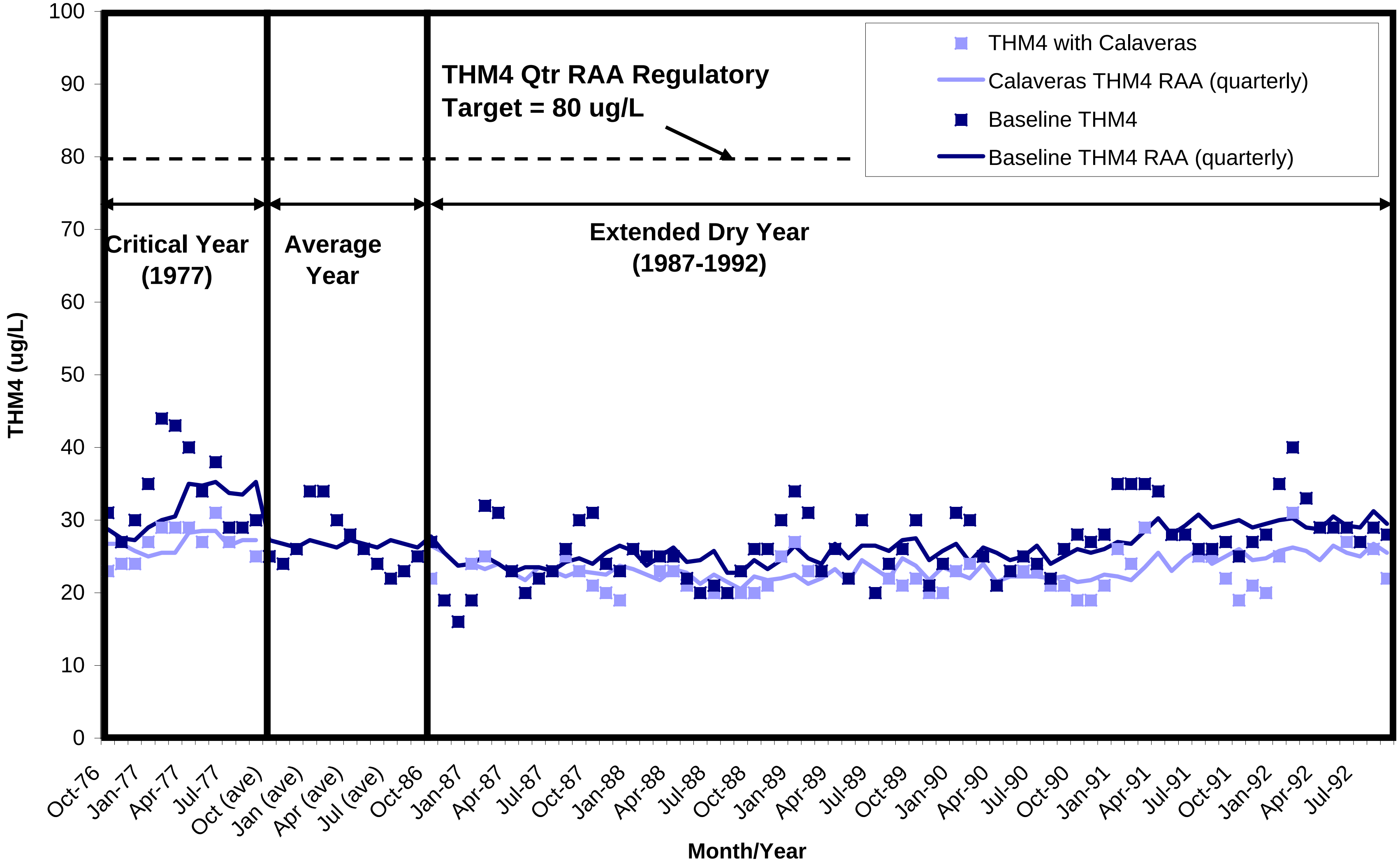
Comparison of SCVWD Source Water TOC with Calaveras (Water Supply Operation) Concept TOC



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

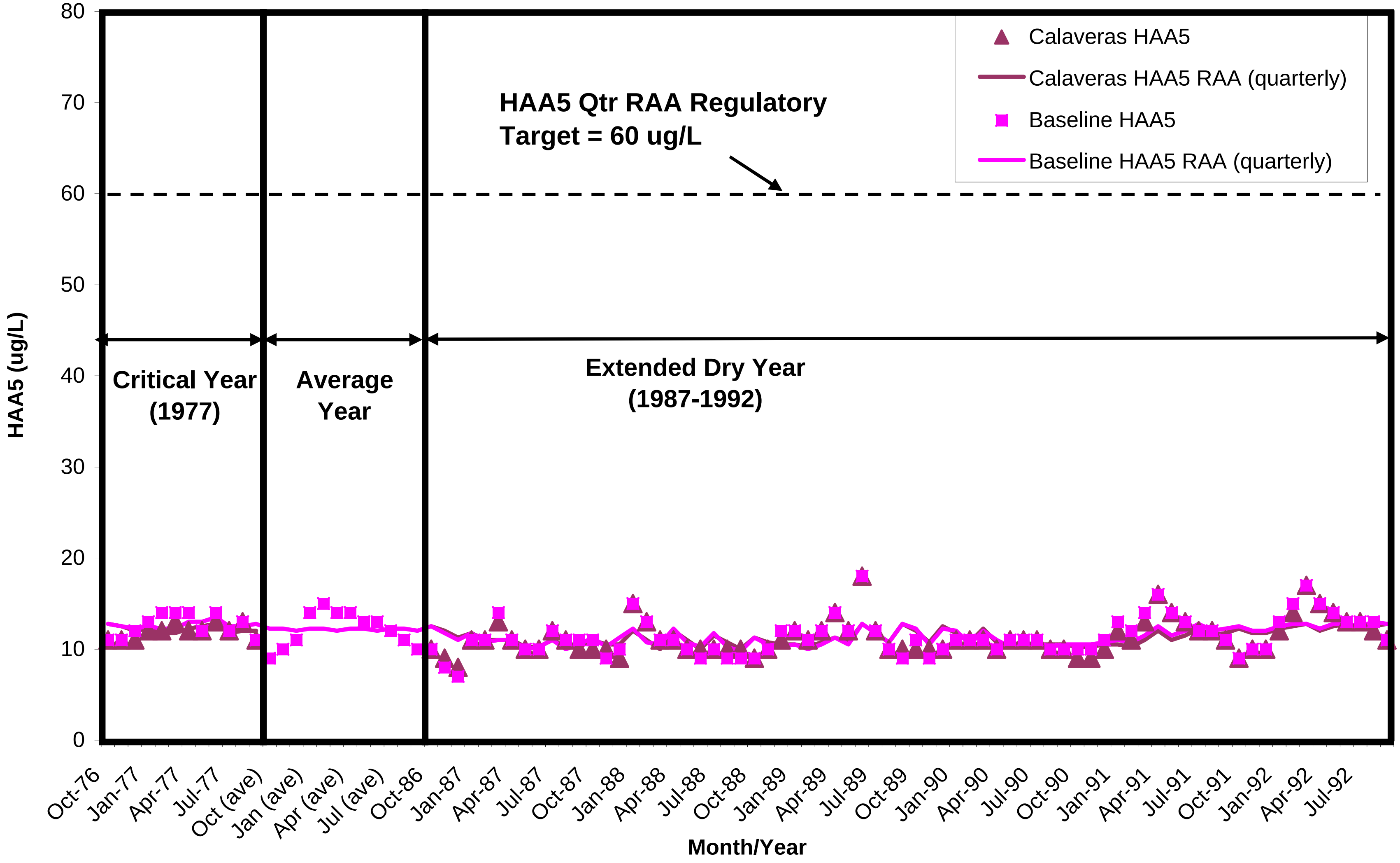
Comparison of SCVWD Baseline THM4 with Calaveras (Water Supply Operation) Concept THM4



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

Comparison of SCVWD Baseline HAA5 with Calaveras (Water Supply Operation) HAA5



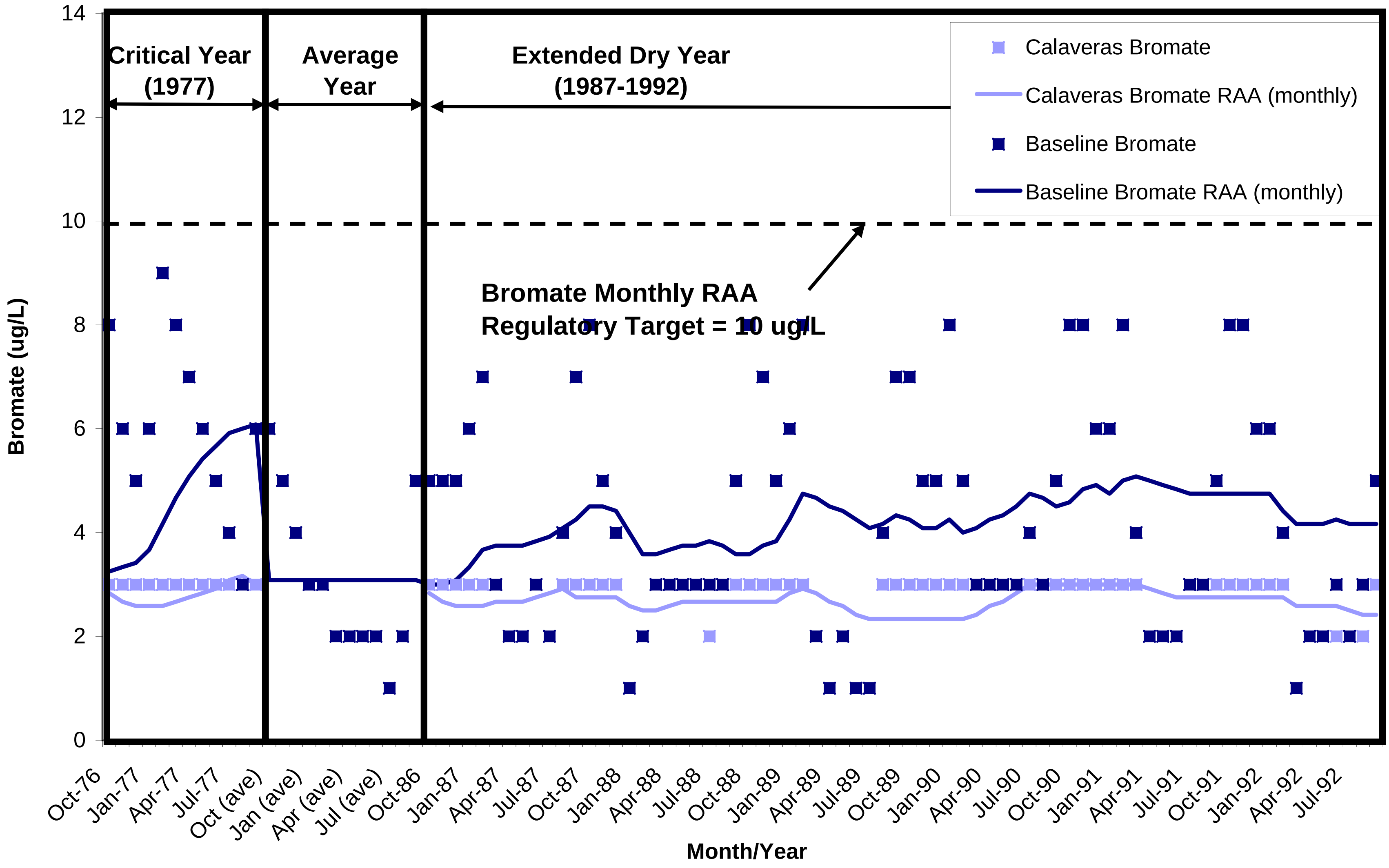
Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

Calaveras Reservoir Expansion Concept

[

(Maximize Water Supply)

Comparison of SCVWD Baseline Bromate with Calaveras (Water Supply Operation) Concept Bromate

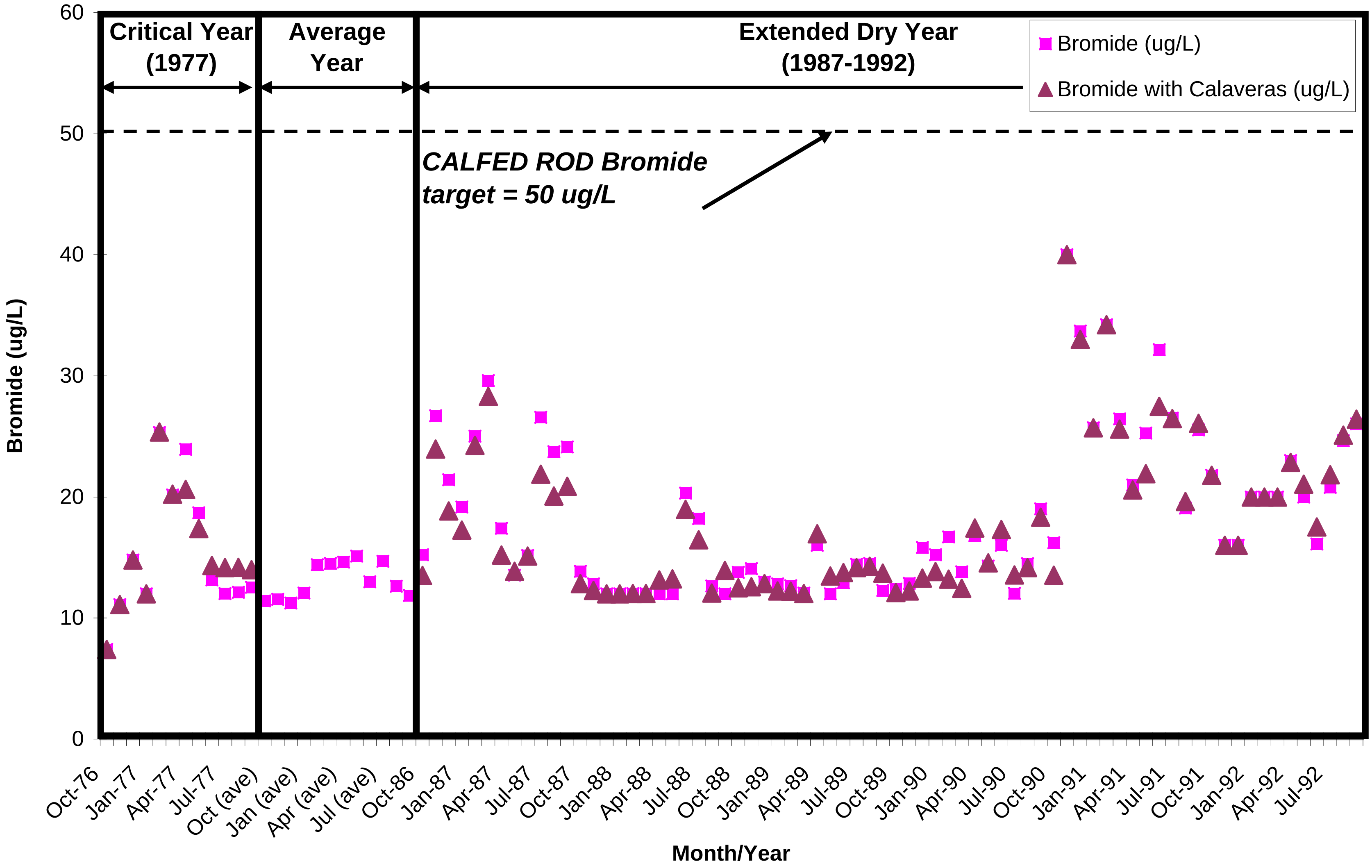


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

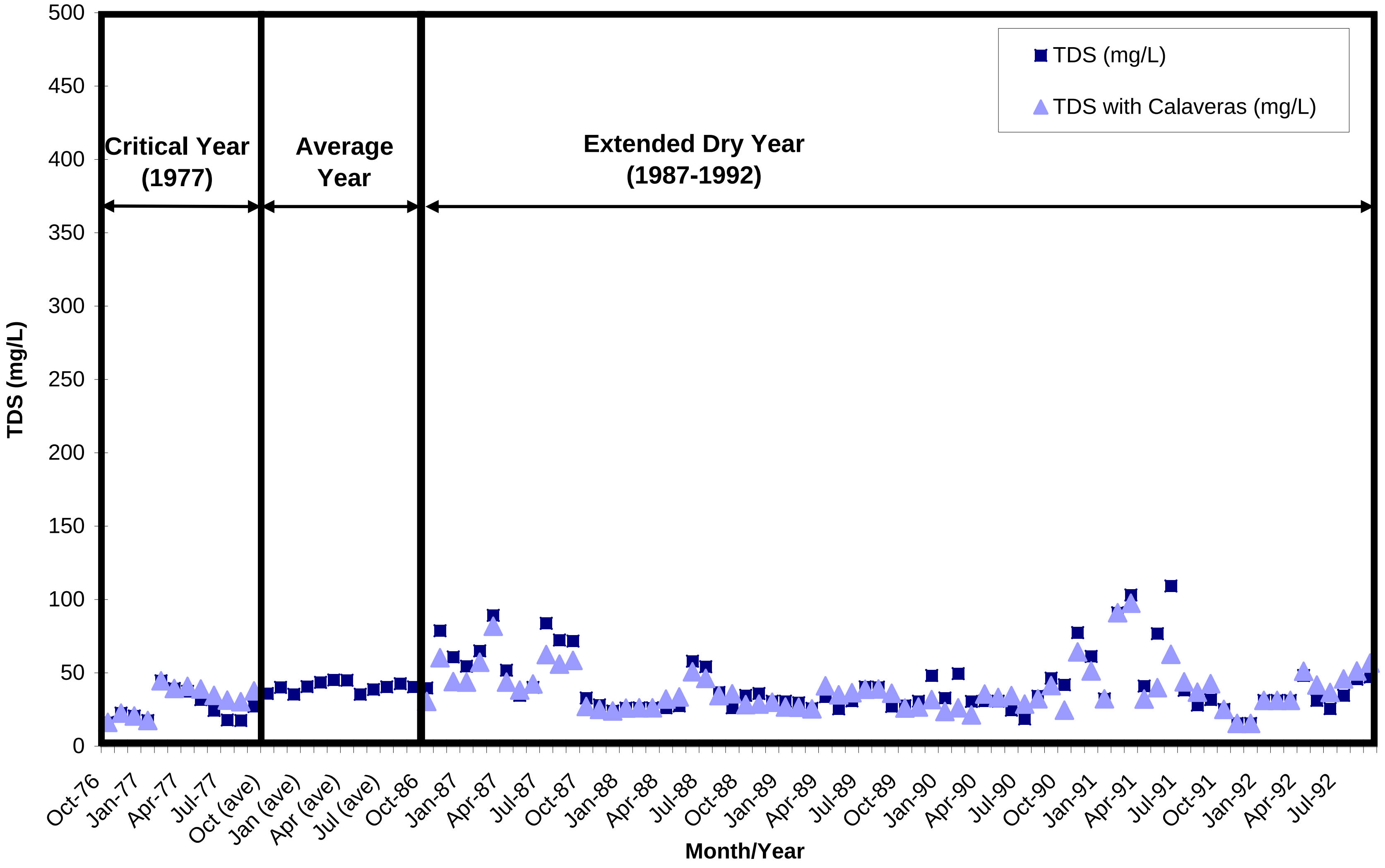
Comparison of SFPUC Source Water Bromide with Calaveras (Water Supply Operation) Concept Bromide



NNote: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept
(Maximize Water Supply)

Comparison of SFPUC Source Water TDS with Calaveras (Water Supply Operation) Concept TDS

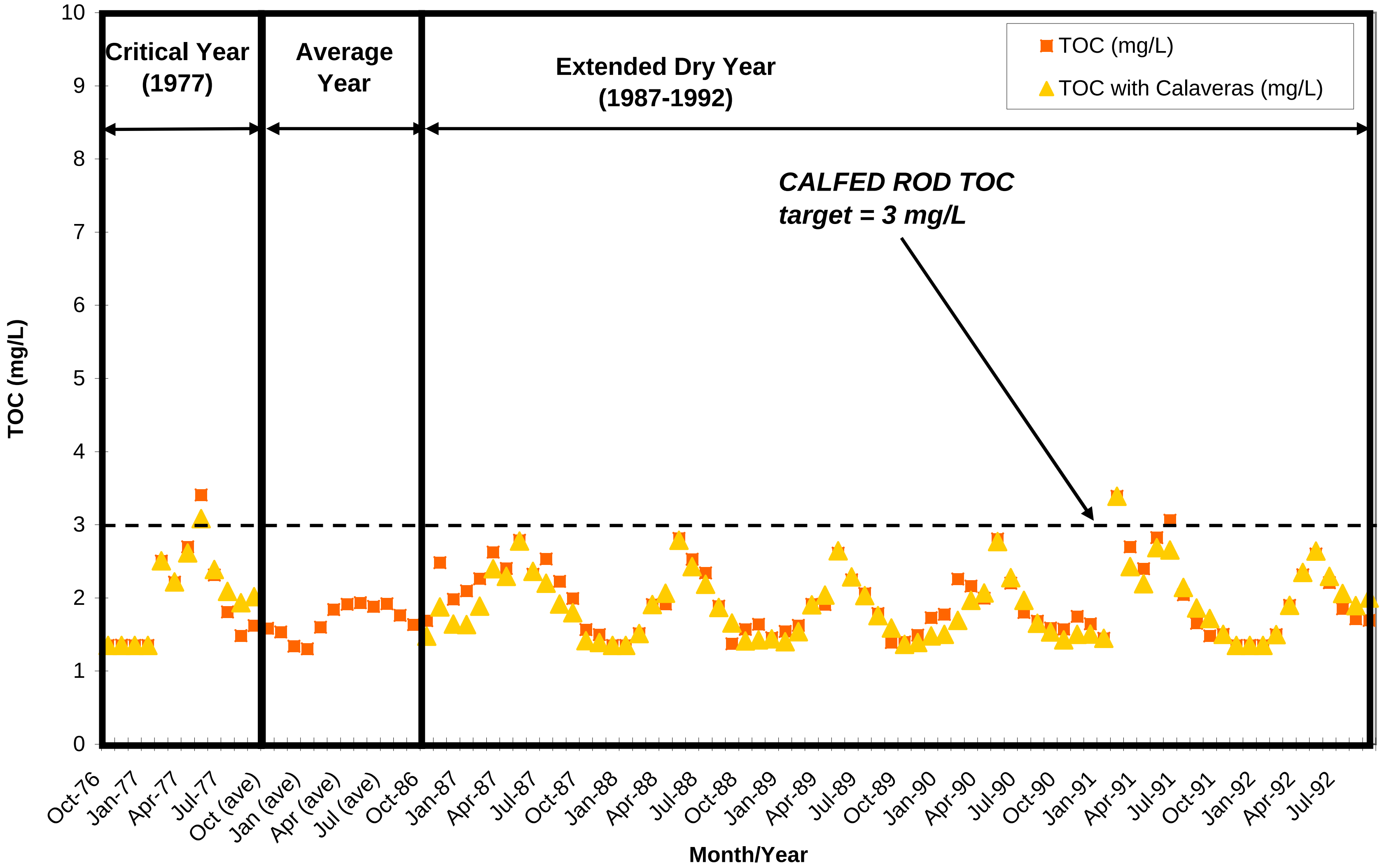


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

Comparison of SCVWD Source Water TOC with Calaveras (Water Supply Operation) Concept TOC

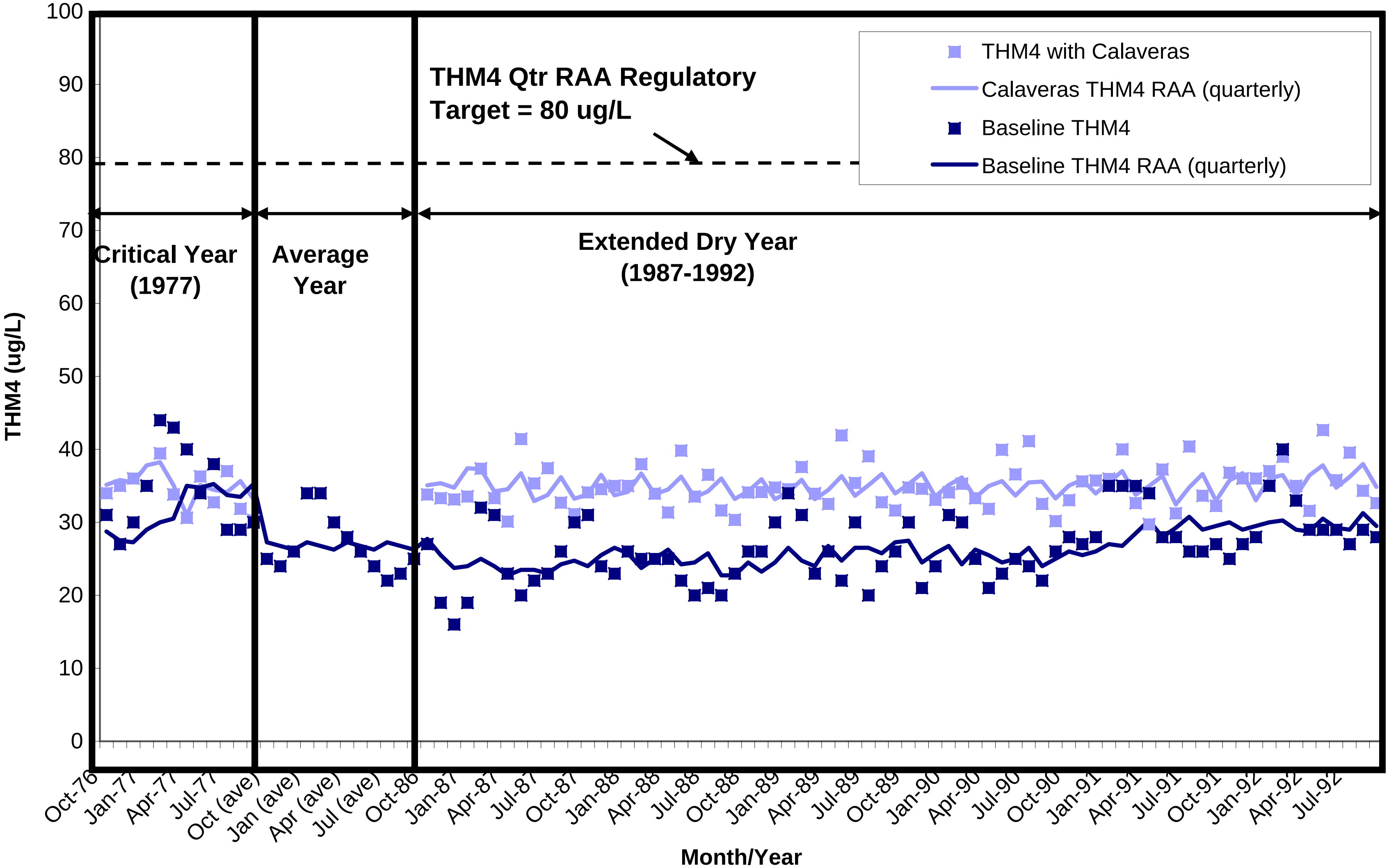


Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)

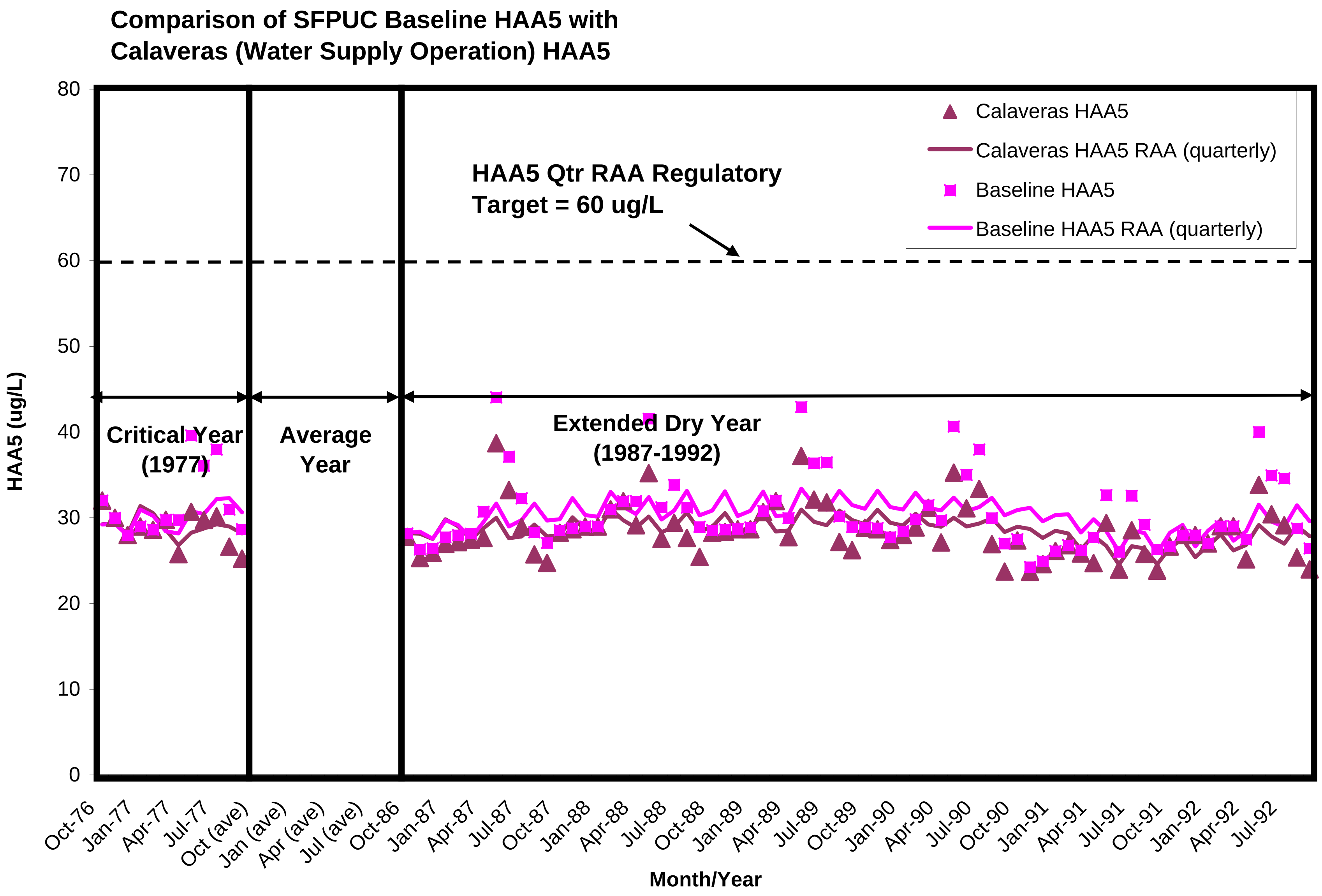
Comparison of SFPUC Baseline THM4 with Calaveras (Water Supply Operation) Concept THM4



Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

Calaveras Reservoir Expansion Concept

(Maximize Water Supply)



Comparison of SFPUC Baseline HAA5 with Calaveras (Water Supply Operation) HAA5

Note: Calaveras water quality is the projected blended water quality of Calaveras diversions and SBA supplies. Simulated DBP production assuming settled water ozonation.

G3 Los Vaqueros Reservoir Expansion

G3 Los Vaqueros Reservoir Expansion Concept

Los Vaqueros Expansion

Extended Dry Year Supply	42,000 AFY
Average Year Water Quality Supply	121,000 AFY

Cost ($2008)

Capital Cost	$1,500 M
O&M Cost	$27.5 M/Yr
Unit Cost	TBD in future studies

Potential Owning Agency
TBD in future studies.

Potential Bay Area and CALFED Agency Partners
CCWD, Zone 7, ACWD, SCVWD, SFPUC(1), DWR, USBR

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

DESCRIPTION

The Los Vaqueros Reservoir Expansion would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. Two reservoir capacities (300,000 AF and 500,000 AF) and two diversion capacities, 1,000 cubic feet/second (cfs) and 1,750 cfs (500,000 AF reservoir only), have been evaluated.

The CALFED Los Vaqueros Reservoir Expansion Studies evaluated several operating modes for the reservoir, evaluating single purpose projects (e.g., drought supply to Bay Area agencies, or operations solely in support of environmental water) to determine the extent of benefits possible, and multi-purpose scenarios to balance objectives (a combination of the drought supply and environmental water). Water quality benefits are provided in all cases. For the Bay Area Water Quality & Supply Reliability Program draft scorecard, results from the multi-purpose operating scenario with a 500,000 AF reservoir and 1,750 cfs diversion rate (Expansion Studies Scenario 5A) are presented; this scenario has dry-year benefits, water quality benefits, and water for Environmental Water Account (EWA) management, and is presented as an example scenario for this concept. The potential Bay Area partners for this project are Contra Costa Water District, the three South Bay Aqueduct contractors: Zone 7, Alameda County Water District, and the Santa Clara Valley Water District. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

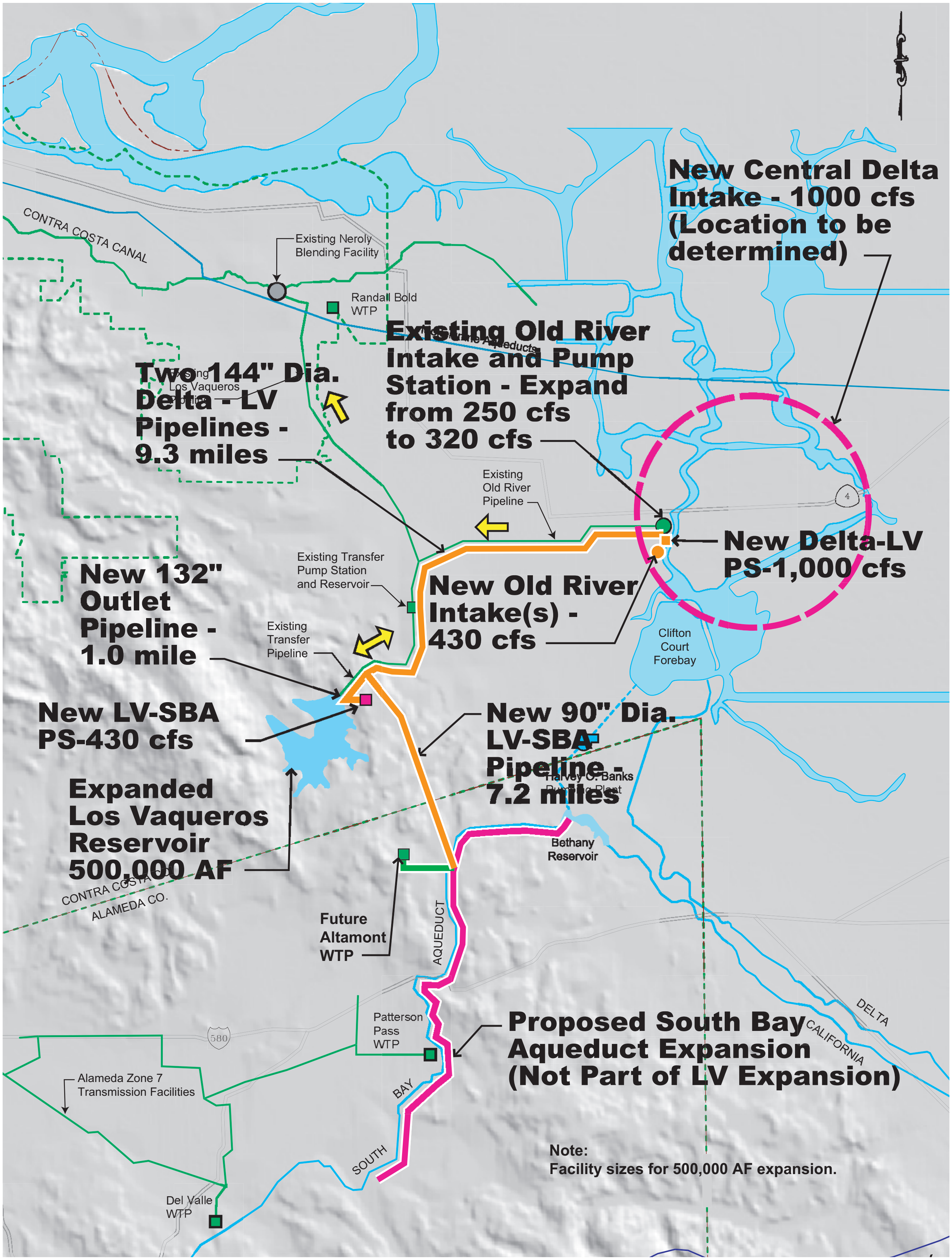
Under the environmental water operations, the expanded Los Vaqueros Reservoir would store high quality water during periods of high flow when diversions would have low impacts on aquatic resources. The project would deliver up to 165,000 acre-feet per year (AFY) of Delta water to the South Bay Aqueduct via a new pipeline from the expanded reservoir to the South Bay Aqueduct's Dyer Backsurge Pool. This operation would make up for reduced pumping at the Harvey O. Banks (Banks) Pumping Plant and the Tracy Pumping Plant and help meet EWA Program objectives to protect aquatic resources and improve habitat conditions. Water would be stored in the reservoir when Delta water quality is high, so that delivered water quality to the South Bay Aqueduct would be improved.

The concept provides benefits in two ways. The additional storage capacity provides increased supply reliability in dry years by providing additional supply that would otherwise be unavailable. In addition, in all year types, a portion of the South Bay Aqueduct contractors' State Water Project allocation can be served through the expanded reservoir instead of being delivered via Banks Pumping Plant, thereby offsetting Delta pumping. Water quality benefits are expected to accrue from the entire quantity of water delivered through the expanded reservoir, including the water delivered for increased supply reliability, as well as the water delivered through the reservoir to offset Delta pumping. On the scorecard, the supply reliability quantity is identified in Table 1 for the performance measure "Meet Demands," and the entire quantity of water conveyed through the reservoir is identified in Tables 2a through 2d for the Public Health Protection (water quality) performance measures. The supply quantities reported do not include Semitropic groundwater banking program deliveries. Concept supply quantities reported for Contra Costa Water District do not include baseline deliveries from the existing Los Vaqueros Reservoir, and reflect the incremental change in delivery quantities from the expanded reservoir.

Potential Partner and Supply Amounts

Type of Benefit	Potential Amount (AFY)	Notes/Issues
CCWD		
Dry-year supply	10,000 AFY	Estimated in Los Vaqueros Reservoir Expansion Studies.
SBA Contractors (Zone 7, SCVWD, ACWD)		
Dry-year supply	32,000 AFY (average of WY1987 through WY1992)	Estimated in Los Vaqueros Reservoir Expansion Studies.
SFPUC(1)		
Dry-year supply	To be determined in future studies	
SBA Contractors (Zone 7, SCVWD, ACWD)		
Average year water quality potential improvement	121,000 AFY of higher quality water to the SBA (average of WY1922 through WY 1994)	Estimated in Los Vaqueros Reservoir Expansion Studies.

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.


New Central Delta Intake - 1000 cfs (Location to be determined)
CONTRA COSTA CANAL
Existing Neroly Blending Facility
Randall Bold WTP
Existing Old River Intake and Pump Station - Expand from 250 cfs to 320 cfs
Aqueducts
Two 144" Dia. Delta - LV Pipelines - 9.3 miles
Existing Los Vaqueros Pipeline
Existing Old River Pipeline
4
New Delta-LV PS-1,000 cfs
Existing Transfer Pump Station and Reservoir
New Old River Intake(s) - 430 cfs
New 132" Outlet Pipeline - 1.0 mile
Existing Transfer Pipeline
Clifton Court Forebay
New LV-SBA PS-430 cfs
New 90" Dia. LV-SBA Pipeline - 7.2 miles
Harvey O. Banks Pumping Plant
Bethany Reservoir
Expanded Los Vaqueros Reservoir 500,000 AF
CONTRA COSTA CO.
ALAMEDA CO.
Future Altamont WTP
AQUEDUCT
Patterson Pass WTP
580
Proposed South Bay Aqueduct Expansion (Not Part of LV Expansion)
DELTA
CALIFORNIA
Alameda Zone 7 Transmission Facilities
BAY
SOUTH
Del Valle WTP

Note:
Facility sizes for 500,000 AF expansion.

Legend

🟧 Los Vaqueros Expansion Facilities

CDM

Figure G3-1

Los Vaqueros Reservoir Expansion Concept Facilities

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Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Table G3-1 - Supply Reliability Score Card

Performance Objective/Subobjective	Agency Baseline Amount or Description	Agency Baseline Units	Los Vaqueros Reservoir Expansion Concept Reliability Supply Increment[5] Amount or	Units	Agency Baseline Plus Los Vaqueros Reservoir Expansion Concept Amount or	Units	Notes/Other
Meet Demand			Compares supply from concept with baseline supply				
Critical Drought							Results reported for 500,000 AF reservoir with 1,750 cfs diversion, and both water quality and supply reliability objectives (Scenario 5A). Allocations amongst SBA contractors for baseline and expanded reservoir scenario provided by LVR Expansion Studies Team. Concept quantities shown reflect reliability deliveries only. The total amount of water conveyed to the agencies includes EWA water that would otherwise be delivered via Harvey O. Banks Pumping Plant. Water quality benefits are derived from both the reliability and EWA deliveries. The total quantity of water delivered to each agency through the expanded reservoir can be seen in Tables 2a through 2e.
ACWD Supply (SWP)[1]	20,600	AFY	Up to 10,300	AFY	Up to 30,300	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply[4]	176,800	AFY	Up to 10,000	AFY	Up to 186,800	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	39,400	AFY	Up to 49,500	AFY	Up to 88,900	AFY	
SFPUC Supply[2]	157,000	AFY	Up to TBD[2]	AFY	TBD[2]	AFY	
Zone 7 Supply (SWP)	38,900	AFY	0	AFY	38,900	AFY	
Total Supply[3]	432,700	AFY	Up to 69,800	AFY	TBD[2]	AFY	
Extended Drought							
ACWD Supply (SWP)[1]	25,500	AFY	Up to 5,300	AFY	Up to 35,300	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply[4]	170,800	AFY	Up to 9,400	AFY	Up to 180,200	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	63,000	AFY	Up to 26,700	AFY	Up to 89,700	AFY	
SFPUC Supply[2]	255,000	AFY	Up to TBD[2]	AFY	TBD[2]	AFY	
Zone 7 Supply (SWP)	56,400	AFY	0	AFY	56,400	AFY	
Total Supply[3]	570,700	AFY	Up to 41,418	AFY	TBD[2]	AFY	
Average Year (1984)							
ACWD Supply (SWP)[1]	42,700	AFY	0	AFY	34,900	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply[4]	139,400	AFY	0	AFY	139,400	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	97,800	AFY	0	AFY	97,800	AFY	
SFPUC Supply[2]	329,000	AFY	Up to TBD[2]	AFY	TBD[2]	AFY	
Zone 7 Supply (SWP)	71,400	AFY	0	AFY	71,400	AFY	
Total Supply[3]	680,300	AFY	0	AFY	TBD[2]	AFY	
Vulnerability							
ACWD	CCWD and SBA contractors susceptible to water quality problems in the Delta, including potential Delta levee failures during a major seismic event.		Reduces Vulnerability - Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
BAWSCA Agencies							
CCWD							
SCVWD							
Zone 7							
BAWSCA	N/A		N/A				
EBMUD	N/A		N/A				
SFPUC[2]	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		TBD[2]				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - Under all institutional structures, CCWD would retain ownership and control of the watershed and operations of the project (CALFED, 2004). An ownership agreement would be developed outlining this. A governing entity would be formed to represent the project beneficiaries to: 1) collect payments from participants; 2) enter into an operating agreement with CCWD for operations, maintenance and replacement; and 3) enter into water service and exchange agreements to provide an agreed-upon level of water service.							

1. ACWD baseline SWP supply numbers are based on SBA delivery information generated by internal District modeling conducted after the Los Vaqueros Expansion studies modeling used in this study. Los Vaqueros Reservoir Expansion concept supply quantities to all agencies, including ACWD, are based on Los Vaqueros Reservoir Expansion Studies modeling. Concept and Baseline plus Concept delivery quantities to ACWD reflect Los Vaqueros Expansion Studies modeling baseline supplies of 20,000, 30,000, and 34,900 AFY for critical dry, extended dry, and average years, as opposed to the District-furnished supply baselines of 20,600, 25,500 and 42,700 AFY, respectively.
2. Details of potential SFPUC participation will be developed in future studies.
3. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.
4. Concept supply quantities for CCWD reflect the incremental increase in deliveries from the enlarged reservoir, and do not include deliveries from the existing reservoir.
5. Concept supply quantities do not include Semitropic groundwater banking program deliveries.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Table G3-2 - Public Health Protection Scorecard

Concept: Los Vaqueros Reservoir Expansion

	Concept		Baseline Plus Concept		
Performance Measure/Objective	**Los Vaqueros Reservoir Expansion Source Water**	**Los Vaqueros Reservoir Expansion Treated Water**	**Los Vaqueros Reservoir Expansion Source Water**	**Los Vaqueros Reservoir Expansion Treated Water**	**Notes**
Variability for Treatment					
ACWD	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
BAWSCA Agencies	NA	NA	NA	NA	
CCWD	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies (except slight increase in bromide in average years)
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
SFPUC[1]	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Zone 7	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
Total Dissolved Solids					
ACWD	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
BAWSCA Agencies	NA	NA	NA	NA	
CCWD	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
SFPUC[1]	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Zone 7	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
Disinfection By-Products					
ACWD	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
BAWSCA Agencies	NA	NA	NA	NA	
CCWD	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
SFPUC[1]	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Zone 7	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	NA	NA	Improves T&O	Improvement in source water quality. Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
BAWSCA Agencies	NA	NA	NA	NA	
CCWD	NA	NA	NA	Improves T&O	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	NA	Improves T&O	
SFPUC[1]	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Zone 7	NA	NA	NA	Improves T&O	
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
BAWSCA Agencies	NA	NA	NA	NA	
CCWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
SFPUC[1]	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Zone 7	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	NA	NA	TBD[2]	TBD[2]	Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
BAWSCA Agencies	NA	NA	NA	NA	
CCWD	NA	NA	TBD[2]	TBD[2]	
EBMUD	NA	NA	NA	NA	
SCVWD	NA	NA	TBD[2]	TBD[2]	
SFPUC[1]	TBD[1]	TBD[1]	TBD[2]	TBD[2]	
Zone 7	NA	NA	TBD[2]	TBD[2]	

1. Details of potential SFPUC participation to be developed in future studies.
2. To be determined in future studies.

Table G3-2a - Public Health Protection Score Card by Agency

Agency: CCWD

			Agency Baseline[1]		Quantity of Water Conveyed through the Expanded Reservoir[2,3]		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**CCWD Source Water**	**CCWD Treated Water[1]**	**Los Vaqueros Expansion Source Water**	**Los Vaqueros Expansion Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water[1]**	**Notes**
Supply Quantity									
Critical Year		AFY	176,800		7,800		186,800		
Extended Dry Year		AFY	170,800		23,700		180,200		
Average Year		AFY	139,400		0		139,400		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.22 - 0.66	0.16 - 0.58	NA	NA	0.15 - 0.39	0.10 - 0.31	
	Mean	mg/L	0.43	0.35	NA	NA	0.26	0.20	
TOC	Range	mg/L	2.6 - 5.4	1.8 - 4.2	NA	NA	3.1 - 6.1	2.2 - 4.8	
	Mean	mg/L	4.0	3.0	NA	NA	3.9	2.9	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.04 - 0.65	0.03 - 0.57	NA	NA	0.04 - 0.62	0.03 - 0.54	
	Mean	mg/L	0.25	0.20	NA	NA	0.19	0.14	
TOC	Range	mg/L	2.2 - 7.6	1.4 - 6.1	NA	NA	2.2 - 7.6	1.4 - 6.1	
	Mean	mg/L	3.8	2.7	NA	NA	3.7	2.7	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.07 - 0.27	0.05 - 0.22	NA	NA	0.06 - 0.22	0.03 - 0.17	
	Mean	mg/L	0.17	0.12	NA	NA	0.14	0.10	
TOC	Range	mg/L	2.7 - 6.3	1.8 - 4.9	NA	NA	2.7 - 6.4	1.8 - 5.0	
	Mean	mg/L	3.7	2.7	NA	NA	3.8	2.8	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	334 - 856	355 - 877	NA	NA	245 - 532	266 - 554	
	Mean	mg/L	580	601	NA	NA	384	405	
Extended Dry Year	Range	mg/L	159 - 842	181 - 863	NA	NA	158 - 812	179 - 834	
	Mean	mg/L	370	392	NA	NA	299	321	
Average Year	Range	mg/L	176 - 398	198 - 419	NA	NA	168 - 331	189 - 352	
	Mean	mg/L	273	295	NA	NA	243	265	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	2 - 4	NA	NA	NA	1 - 2	
	Mean	ug/L	NA	2	NA	NA	NA	2	
THM4	Range	ug/L	NA	54 - 82	NA	NA	NA	55 - 84	
	Mean	ug/L	NA	68	NA	NA	NA	63	
HAA5	Range	ug/L	NA	19 - 26	NA	NA	NA	22 - 28	
	Mean	ug/L	NA	23	NA	NA	NA	24	
Extended Dry Year									
Bromate	Range	ug/L	NA	0.3 - 3	NA	NA	NA	ND - 3	
	Mean	ug/L	NA	1	NA	NA	NA	1	
THM4	Range	ug/L	NA	41 - 92	NA	NA	NA	42 - 87	
	Mean	ug/L	NA	60	NA	NA	NA	57	
HAA5	Range	ug/L	NA	18 - 33	NA	NA	NA	19 - 34	
	Mean	ug/L	NA	25	NA	NA	NA	25	
Average Year									
Bromate	Range	ug/L	NA	0.3 - 2	NA	NA	NA	0.3 - 1	
	Mean	ug/L	NA	1	NA	NA	NA	1	
THM4	Range	ug/L	NA	48 - 0	NA	NA	NA	44 - 75	
	Mean	ug/L	NA	57	NA	NA	NA	55	
HAA5	Range	ug/L	NA	21 - 31	NA	NA	NA	21 - 32	
	Mean	ug/L	NA	25	NA	NA	NA	26	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal likelihood	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Assumes 75% Bollman, 25% Randall Bold blend.
2. Concept supply quantities for CCWD reflect the incremental increase in deliveries from the enlarged reservoir, and do not include deliveries from the existing reservoir.
3. Concept supply quantities include the incremental increase in supply Semitropic groundwater banking program deliver

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Table G3-2b - Public Health Protection Score Card by Agency

Agency: ACWD

			Agency Baseline			**Quantity of Water Conveyed through the Expanded Reservoir[2]**		**Baseline Plus Concept**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**Los Vaqueros Expansion Concept Source Water**	**Los Vaqueros Expansion Concept Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (MSJWTP)**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (WTP 2)**	**Notes**
Supply Quantity[1]											
Critical Year		AFY	20,600			16,100		30,300			
Extended Dry Year		AFY	25,500			12,500		35,300			
Average Year		AFY	42,700			34,200		34,900			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	NA	0.09 - 0.24	0.06 - 0.17	0.08 - 0.21	
	Mean	mg/L	0.37	0.28	0.33	NA	NA	0.12	0.08	0.11	
TOC	Range	mg/L	3.4 - 7.3	2.9 - 6.4	2.3 - 5.5	NA	NA	1.8 - 3.4	2.8 - 4.2	2.2 - 3.5	
	Mean	mg/L	5.06	4.38	3.7	NA	NA	2.4	3.3	2.7	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.50598	0.03 - 0.413	0.04 - 0.47	NA	NA	0.02 - 0.44	0.01 - 0.36	0.02 - 0.41	
	Mean	mg/L	0.26	0.20	0.23	NA	NA	0.15	0.11	0.13	
TOC	Range	mg/L	1.6 - 7.33333	1.3 - 6.4	0.9 - 5.5	NA	NA	1.6 - 6.3	1.8 - 5.7	1.4 - 4.8	
	Mean	mg/L	3.70	3.17	2.6	NA	NA	2.7	3.0	2.5	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	NA	0.10 - 0.15	0.07 - 0.11	0.09 - 0.13	
	Mean	mg/L	0.19	0.14	0.17	NA	NA	0.12	0.09	0.11	
TOC	Range	mg/L	2.8 - 5.9025	2.4 - 5.1	1.9 - 4.3	NA	NA	1.6 - 1.6	2.7 - 2.7	2.2 - 2.2	
	Mean	mg/L	3.99	3.43	2.8	NA	NA	1.6	2.7	2.2	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	NA	187 - 355	209 - 377	218 - 386	
	Mean	mg/L	507	529	561	NA	NA	221	243	275	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	NA	147 - 597	169 - 619	178 - 628	
	Mean	mg/L	384	406	438	NA	NA	253	276	307	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	NA	192 - 251	214 - 274	223 - 282	
	Mean	mg/L	296	319	350	NA	NA	218	241	272	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	2 - 6	NA	NA	NA	ND - ND	1 - 3	
	Mean	ug/L	NA	ND	4	NA	NA	NA	ND	1	
THM4	Range	ug/L	NA	82 - 153	26 - 42	NA	NA	NA	69 - 103	22 - 31	
	Mean	ug/L	NA	110	33	NA	NA	NA	80	25	
HAA5	Range	ug/L	NA	47 - 75	16 - 21	NA	NA	NA	54 - 69	18 - 22	
	Mean	ug/L	NA	61	19	NA	NA	NA	59	19	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 5	NA	NA	NA	ND - ND	ND - 5	
	Mean	ug/L	NA	ND	3	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	50 - 142	16 - 38	NA	NA	NA	47 - 132	16 - 37	
	Mean	ug/L	NA	83	26	NA	NA	NA	76	24	
HAA5	Range	ug/L	NA	22 - 92	11 - 26	NA	NA	NA	35 - 78	15 - 25	
	Mean	ug/L	NA	52	17	NA	NA	NA	55	18	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 4	NA	NA	NA	ND - ND	1 - 2	
	Mean	ug/L	NA	ND	2	NA	NA	NA	ND	1	
THM4	Range	ug/L	NA	68 - 116	21 - 33	NA	NA	NA	68 - 71	21 - 23	
	Mean	ug/L	NA	85	26	NA	NA	NA	70	22	
HAA5	Range	ug/L	NA	41 - 74	14 - 22	NA	NA	NA	50 - 53	17 - 18	
	Mean	ug/L	NA	57	19	NA	NA	NA	51	18	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

1. ACWD baseline SWP supply numbers are based on SBA delivery information generated by internal District modeling conducted after the Los Vaqueros Expansion studies modeling used in this study. Los Vaqueros Reservoir Expansion concept supply quantities to all agencies, including ACWD, are based on Los Vaqueros Reservoir Expansion Studies modeling. Concept and Baseline plus Concept delivery quantities to ACWD reflect Los Vaqueros Expansion Studies modeling baseline supplies of 20,000, 30,000, and 34,900 AFY for critical dry, extended dry, and average years, as opposed to the District-furnished supply baselines of 20,600, 25,500 and 42,700 AFY, respectively.

2. Concept supply quantities reflect the incremental increase in deliveries from the enlarged reservoir, and do not include deliveries from the existing reservoir.

Los Vaqueros Reservoir Expansion Concept
(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Table G3-2c - Public Health Protection Score Card by Agency
Agency: SCVWD

			Agency Baseline		Quantity of Water Conveyed through the Expanded Reservoir[1]		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**Los Vaqueros Expansion Concept Source Water**	**Los Vaqueros Expansion Concept Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	39,400		64,800		88,900		
Extended Dry Year		AFY	63,000		42,800		89,700		
Average Year		AFY	97,800		97,800		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	NA	0.09 - 0.24	0.06 - 0.17	
	Mean	mg/L	0.37	0.33	NA	NA	0.12	0.08	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	NA	1.8 - 3.4	2.8 - 4.2	
	Mean	mg/L	5.1	3.9	NA	NA	2.4	3.3	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	NA	0.02 - 0.44	0.01 - 0.36	
	Mean	mg/L	0.26	0.24	NA	NA	0.15	0.11	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	NA	1.6 - 6.3	1.8 - 5.7	
	Mean	mg/L	3.7	2.7	NA	NA	2.7	3.0	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	NA	0.10 - 0.15	0.07 - 0.11	
	Mean	mg/L	0.19	0.17	NA	NA	0.12	0.09	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	NA	1.6 - 1.6	2.7 - 2.7	
	Mean	mg/L	4.0	3.0	NA	NA	1.6	2.7	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	NA	187 - 355	206 - 375	
	Mean	mg/L	507	527	NA	NA	221	241	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	NA	147 - 597	167 - 617	
	Mean	mg/L	384	404	NA	NA	253	273	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	NA	192 - 251	211 - 271	
	Mean	mg/L	296	316	NA	NA	218	238	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	NA	NA	2 - 4	
	Mean	mg/L	NA	6	NA	NA	NA	2	
THM4	Range	mg/L	NA	27 - 44	NA	NA	NA	22 - 32	
	Mean	mg/L	NA	34	NA	NA	NA	25	
HAA5	Range	mg/L	NA	11 - 14	NA	NA	NA	12 - 14	
	Mean	mg/L	NA	13	NA	NA	NA	13	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	NA	NA	ND - 7	
	Mean	mg/L	NA	4	NA	NA	NA	3	
THM4	Range	mg/L	NA	16 - 40	NA	NA	NA	16 - 39	
	Mean	mg/L	NA	27	NA	NA	NA	24	
HAA5	Range	mg/L	NA	7 - 18	NA	NA	NA	10 - 16	
	Mean	mg/L	NA	11	NA	NA	NA	12	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	NA	NA	2 - 3	
	Mean	mg/L	NA	3	NA	NA	NA	2	
THM4	Range	mg/L	NA	22 - 34	NA	NA	NA	22 - 23	
	Mean	mg/L	NA	27	NA	NA	NA	23	
HAA5	Range	mg/L	NA	9 - 15	NA	NA	NA	11 - 12	
	Mean	mg/L	NA	12	NA	NA	NA	12	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		moderate	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Concept supply quantities do not include Semitropic groundwater banking program deliveries.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Table G3-2d - Public Health Protection Score Card by Agency

Agency: Zone 7

			Agency Baseline			Quantity of Water Conveyed through the Expanded Reservoir[1]		Baseline Plus Concept			
Performance Measure/Objective	Metric or Qual	Units	Zone 7 Source Water (SWP)	Zone 7 Treated Water (PPWTP)	Zone 7 Treated Water (DVWTP)	Los Vaqueros Expansion Concept Source Water	Los Vaqueros Expansion Concept Treated Water	Los Vaqueros Expansion plus Agency Baseline Source Water	Expansion plus Agency Baseline Treated Water (PPWTP)	Expansion plus Agency Baseline Treated Water (DVWTP)	Notes
Supply Quantity											
Critical Year		AFY	38,900			12,181		38,900			
Extended Dry Year		AFY	56,400			14,394		56,400			Zone 7 is not interested in additional dry year supply. Water taken from this concept would offset SBA supplies.
Average Year		AFY	71,400			71,400		71,400			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	0.09 - 0.24	0.09 - 0.24	0.09 - 0.24	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	0.12	0.12	0.12	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	1.8 - 3.4	1.8 - 3.4	1.8 - 3.4	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	2.4	2.4	2.4	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	0.02 - 0.44	0.02 - 0.44	0.02 - 0.44	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	0.15	0.15	0.15	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	1.6 - 6.3	1.6 - 6.3	1.6 - 6.3	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	2.7	2.7	2.7	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	NA	NA	0.10 - 0.15	0.10 - 0.15	0.10 - 0.15	
	Mean	mg/L	0.19	0.15	0.15	NA	NA	0.12	0.12	0.12	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	NA	NA	1.6 - 1.6	1.6 - 1.6	1.6 - 1.6	
	Mean	mg/L	4.0	3.7	3.7	NA	NA	1.6	1.6	1.6	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	187 - 355	196 - 365	196 - 365	
	Mean	mg/L	507	517	517	NA	NA	221	231	231	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	147 - 597	157 - 607	157 - 607	
	Mean	mg/L	384	394	394	NA	NA	253	263	263	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	NA	NA	192 - 251	201 - 261	201 - 261	
	Mean	mg/L	296	306	306	NA	NA	218	228	228	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	55 - 81	56 - 84	
	Mean	ug/L	NA	86	89	NA	NA	NA	63	65	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	39 - 51	40 - 52	
	Mean	ug/L	NA	44	46	NA	NA	NA	43	44	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	38 - 105	40 - 108	
	Mean	ug/L	NA	67	67	NA	NA	NA	60	61	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	29 - 59	31 - 60	
	Mean	ug/L	NA	39	39	NA	NA	NA	40	41	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	NA	NA	54 - 56	55 - 57	
	Mean	ug/L	NA	68	69	NA	NA	NA	55	56	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	NA	NA	36 - 38	37 - 39	
	Mean	ug/L	NA	43	43	NA	NA	NA	37	38	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall quality	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

1. Concept supply quantities do not include Semitropic groundwater banking program deliveries.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Table G3-3 - Cost, Environmental and Implementation Score Card

	Concept Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	$1500M (2008 $)	Cost estimates from CALFED Los Vaqueros Expansion Studies (CALFED, 2004). Annual costs and potential cost-sharing options will be evaluated in future phases of the CALFED Los Vaqueros Reservoir Expansion studies.
Operating & Maintenance Cost	$27.5M (2008 $)	
Environmental Mitigation Cost	TBD^2	
Lifecycle Cost	TBD^2	
Allocation of Costs	N/A	
Environmental Impacts^1		
Overall Impacts to Environment^1	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Potential effects are primarily associated with terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land. However, design of the facility would benefit aquatic resources, thus offsetting impacts to terrestrial resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts on existing watershed lands and lands owned by potential partner agencies or open space managers. In addition, acquisition of additional land for protection, restoration, and/or enhancement would occur. Mitigation acreage would range from 1,953 to 8,576 acres. Effects on recreation would be offset by the restoration and augmentation of trails (increase in 17 miles of trails).	
Overall Benefits to Environment^1	**Overall Benefits to the Environment (Before Mitigation): High Benefits**. Potential benefits associated with the proposed concept include the following: - Installation of state-of-the-art fish screens for diversions to the SBA, - Flexibility to shift the timing and location of water diversions to protect fish, - System flexibility to store and move water (including for environmental water storage); also, provision of additional storage (for natural disasters, toxic spills, or levee failures in the Delta). **Overall Benefits to the Environment (After Mitigation): High Benefits**. Benefits would then be associated with increased protected and restored land as well as additional recreation opportunities (see mitigation opportunities above).	
Implementation Potential		
External Support	TBD^2	
Ability to Get Outside Funding	TBD^2 - Potential funding sources include any combination of federal (USBR), state (DWR) and local (Bay Area water agencies using the facilities).	
Consistency with Local and Regional Plans	Consistent with Local and Regional Plans - Consistency with local and regional plans is maximized by: - Improving water quality and reliability for CCWD - Enhancing the Delta environment - Protecting and enhancing the fisheries and terrestrial species benefits provided by the existing Los Vaqueros Project - Preserving and increasing the recreational opportunities of the LV Project - Retaining CCWD control of the watershed and operation of the reservoir - Protecting and reimbursing the financial investment made by the CCWD customers - Placing the proposal before the voters of the CCWD The project has not been evaluated for consistency with other local and regional plans and policies.	
Regional Perspective		
Number of Agencies Receiving Benefits	4	ACWD, CCWD, SCVWD, Zone 7, SFPUC
Population Receiving Benefits	4,400,000 people	

1. This section provides a general environmental score. For detailed scoring on several environmental topics, see Table 4.

2. To be determined in future studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

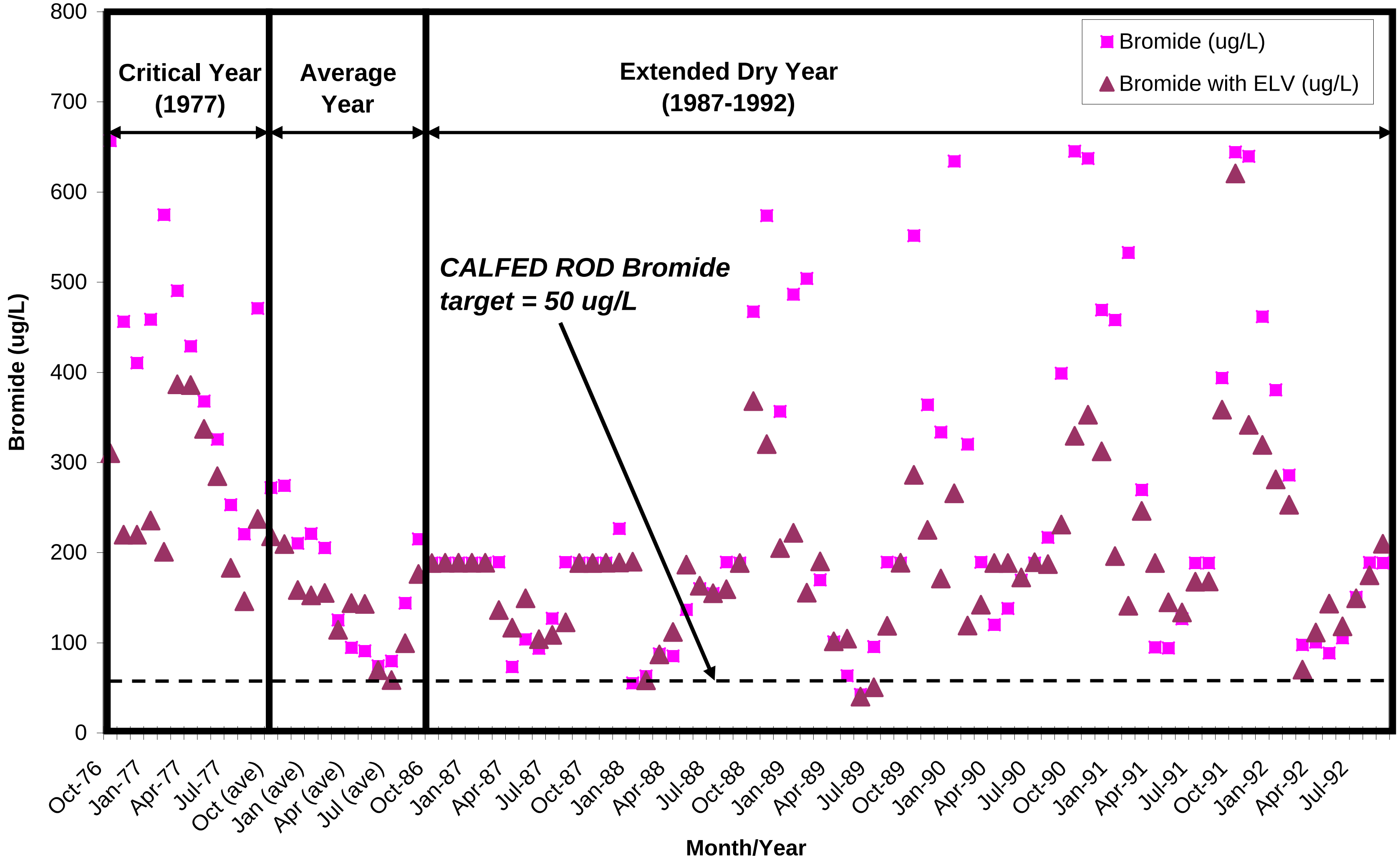
Table G3-4 - Environmental Score Card

Performance Measure/Objective	Concept Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation). Benefits.** Reduces direct fish losses from water diversions (incremental increase in loss of juvenile fish at the new Delta intakes offset by a substantial reduction in direct fish loss at the SWP [or CVP] diversion facility), through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). **Effects on Aquatic Environment (After Mitigation): No Effect.** The concept was designed to minimize potential effects to aquatic environment. Thus, no mitigation measures would be required.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Total direct effects from both reservoir expansion and facilities construction: - Total direct effects to terrestrial habitat of up to 2,595 acres (permanent and temporary). - 2,081 acres of grassland - 309 acres of oak woodland - 11 acres of chaparral / upland scrub - 0.01 acre of riparian - 3.6 acres of urban-ruderal - 189 acres of agriculture - 1,960 acres from inundation. **Effects on Terrestrial Environment (After Mitigation): Benefits.** The Mitigation strategy would provide for resource enhancement in accordance with CALFED Program guidance and in coordination with regional conservation. It includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres (CALFED, 2004).
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** Total direct effects from inundation would be 1.3 acres. **Effects on Wetlands (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes wetlands.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** Each habitat type identified under “terrestrial environment,” above, is associated with special status species, including but not limited to: - San Joaquin kit fox, - California red-legged frog, - California tiger salamander, - Western pond turtle, - Bald eagle, - Curved-foot hygrotis diving beetle, - Mason’s lilaeopsis, - Alkali milk-vetch, - Heartscale, - Brittlescale, - San Joaquin spearscale, - Recurved larkspur, - Contra Costa goldfields, - Vernal pool fairly shrimp, etc. **Effects on Special-Status Species (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes protection of habitat that support these species.
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** The proposed concept would consume 183 million kwh of energy. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of CCWD Baseline Source Water Bromide with Expanded Los Vaqueros Concept Bromide

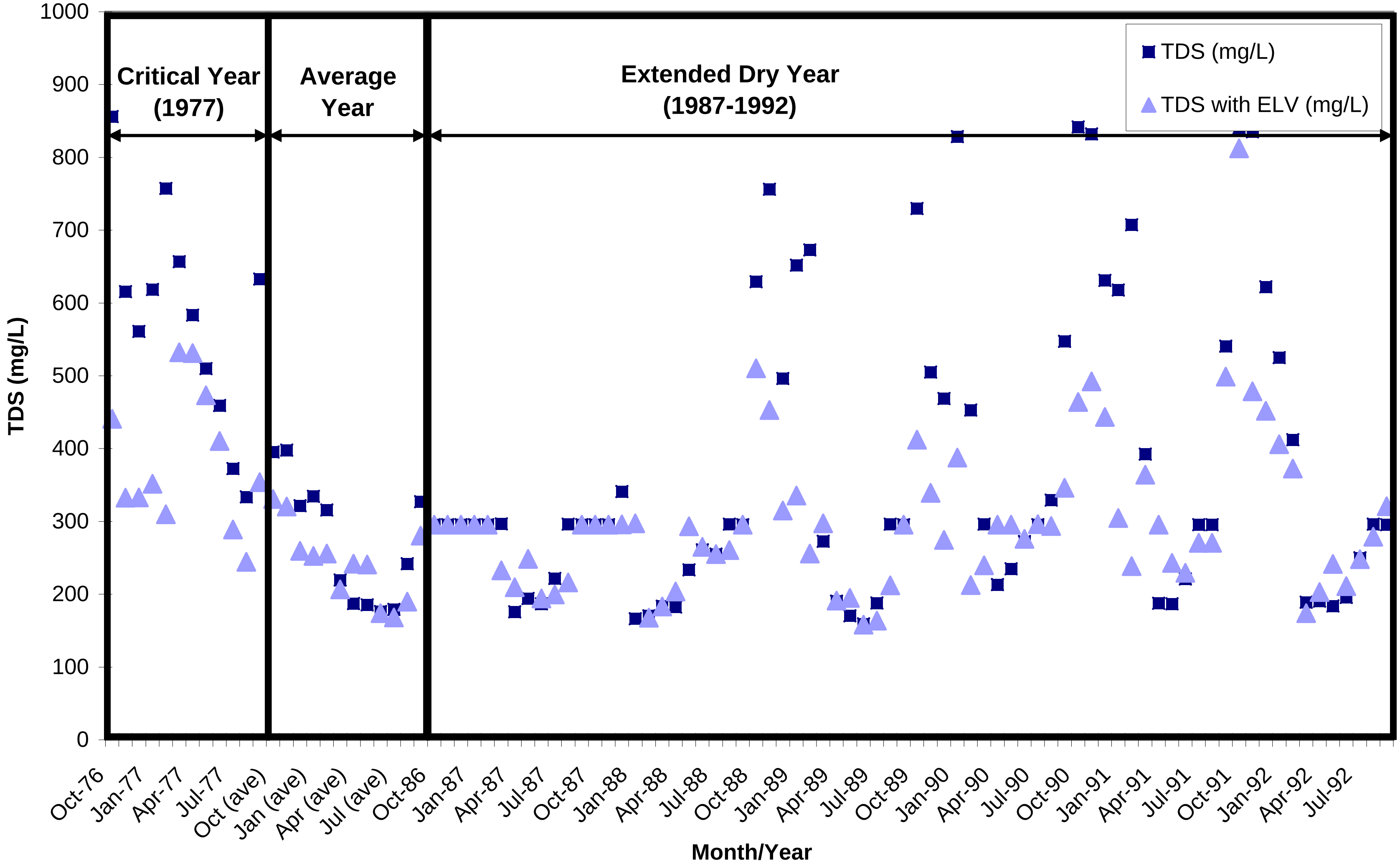


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of CCWD Baseline Source Water TDS with Expanded Los Vaqueros Concept TDS

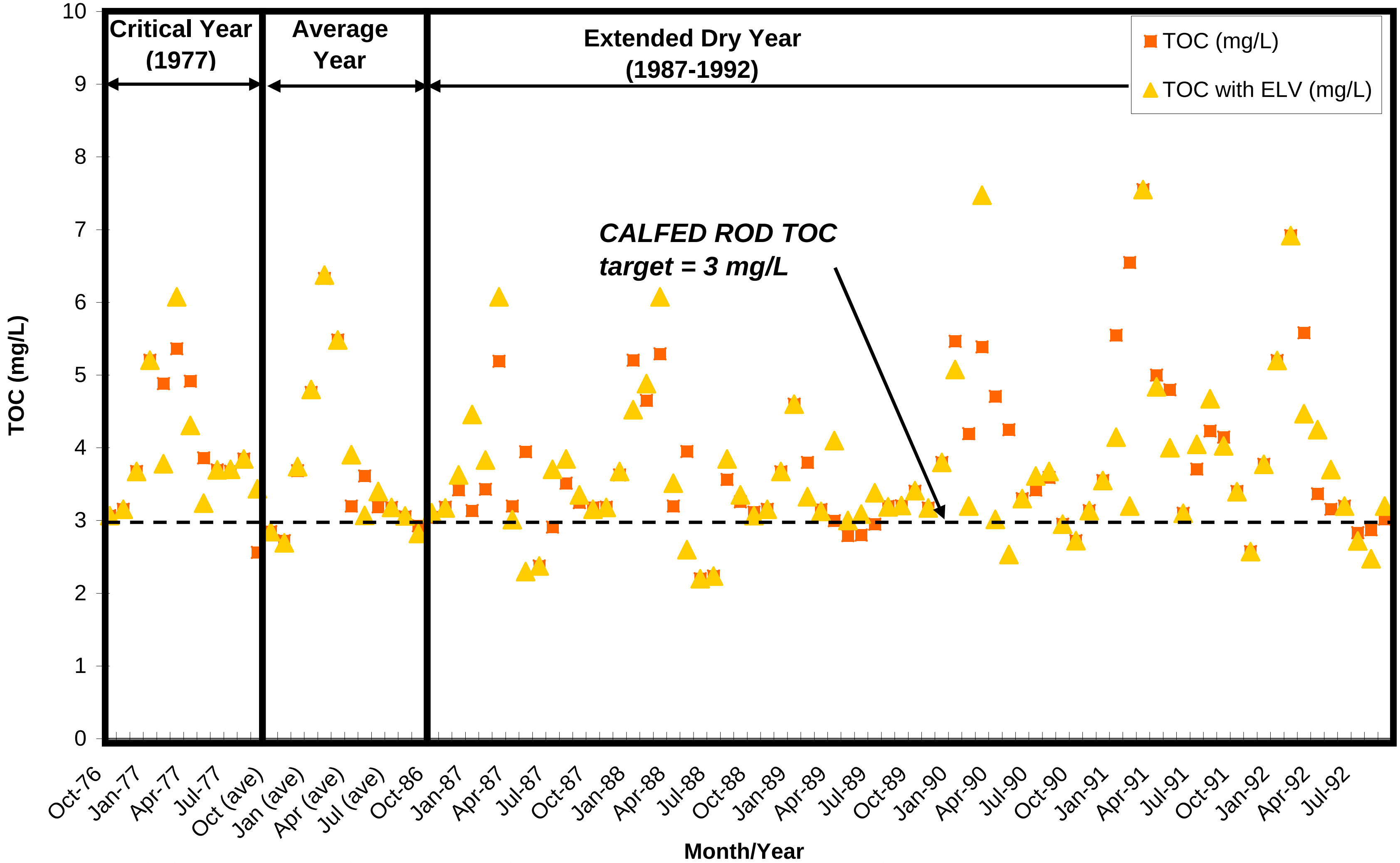


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

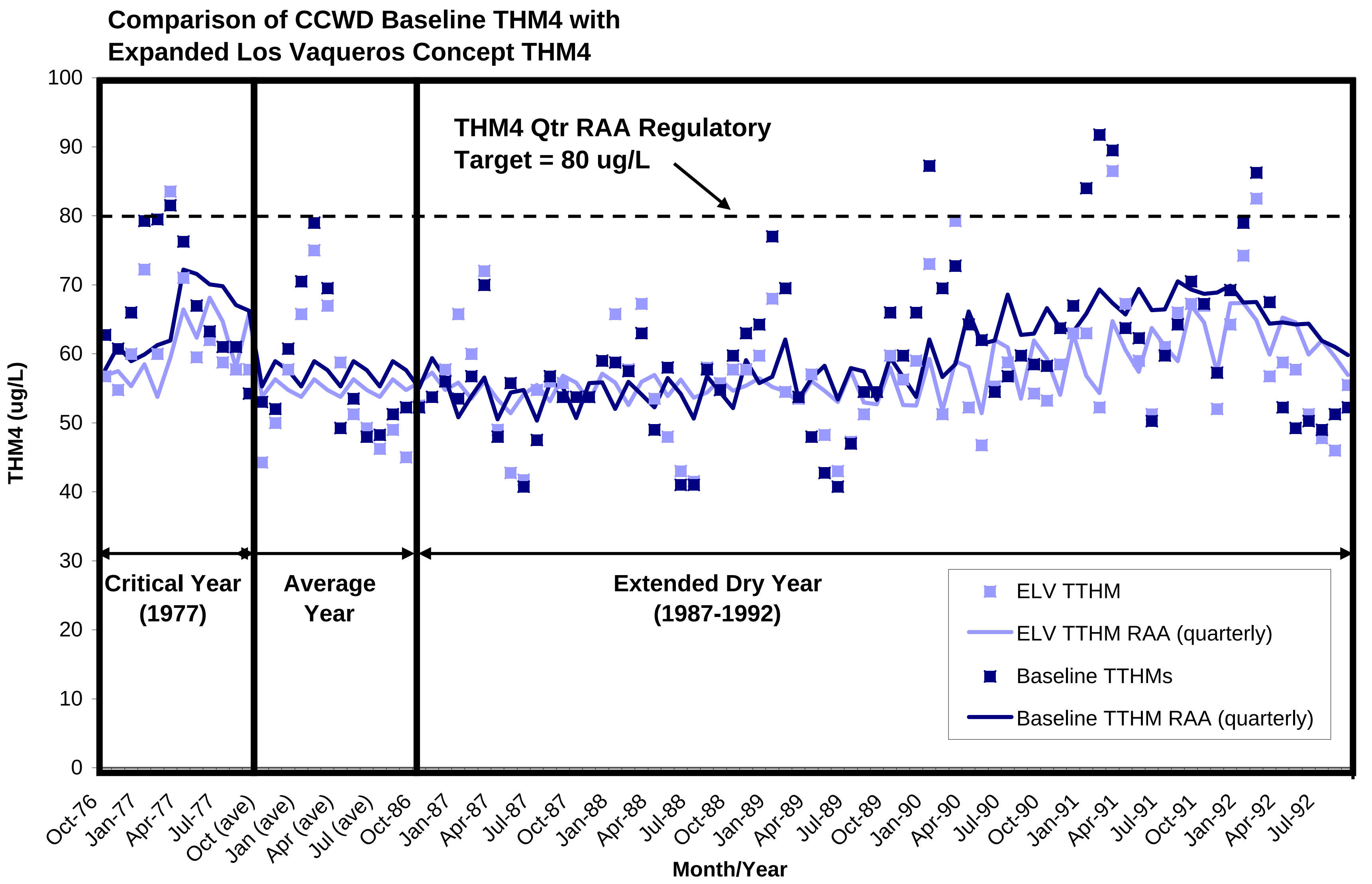
Comparison of CCWD Baseline Source Water TOC with Expanded Los Vaqueros Concept TOC



Note: ELV water quality is the flow-weighted mixture of Rock Slough, Old River and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

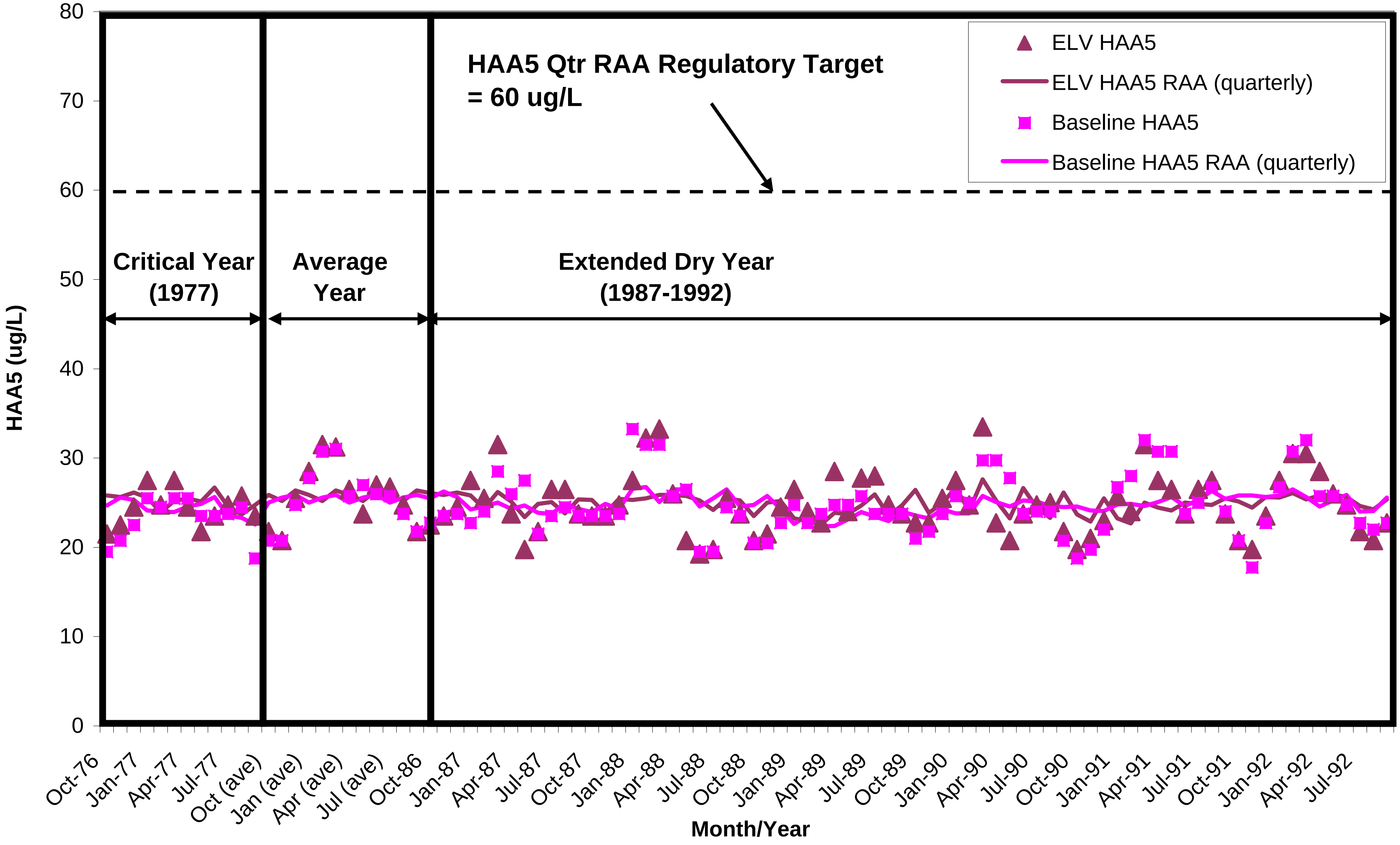


Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of CCWD Baseline HAA5 with Expanded Los Vaqueros Concept HAA5



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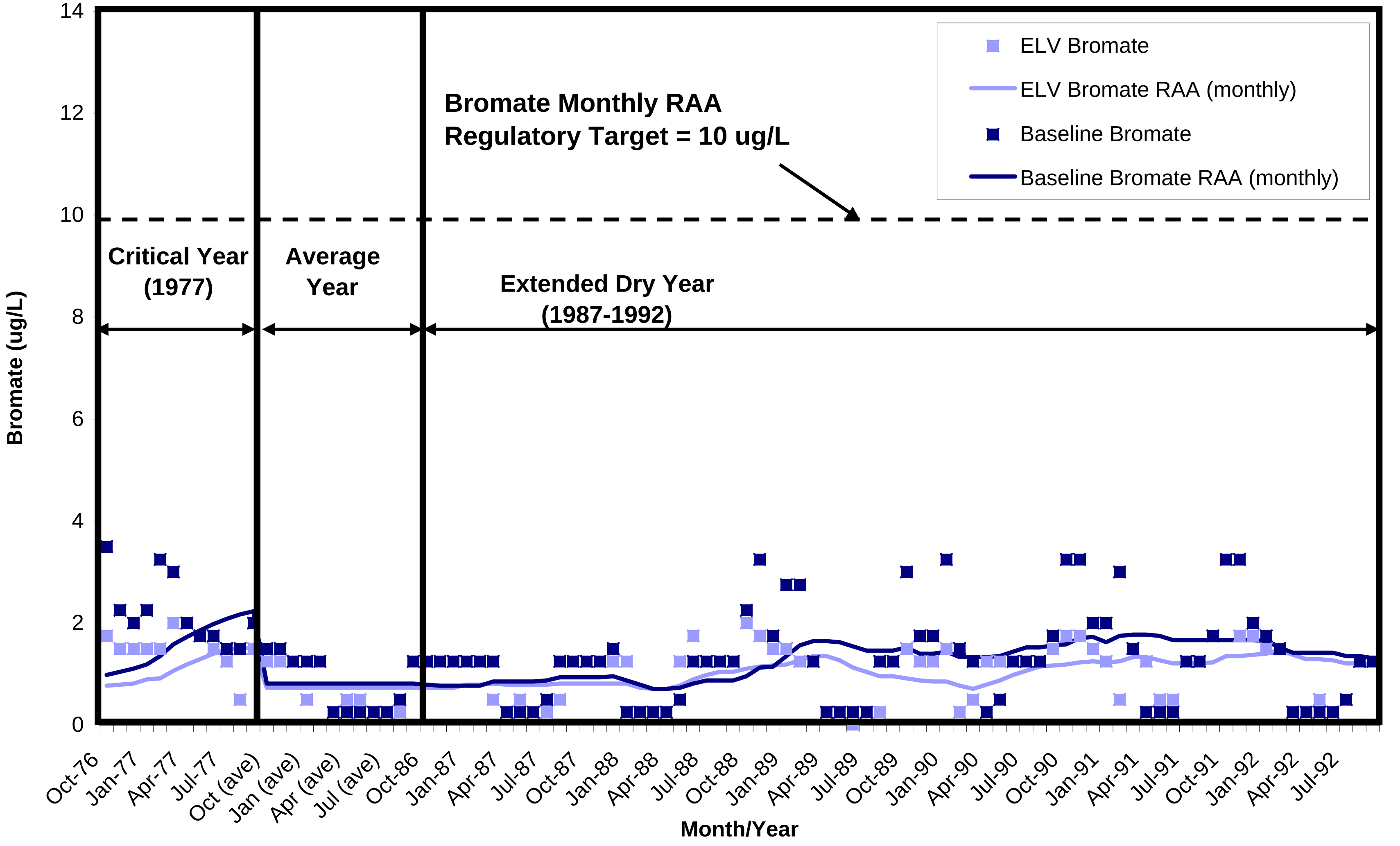
Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of CCWD Baseline Bromate with Expanded Los Vaqueros Concept Bromate

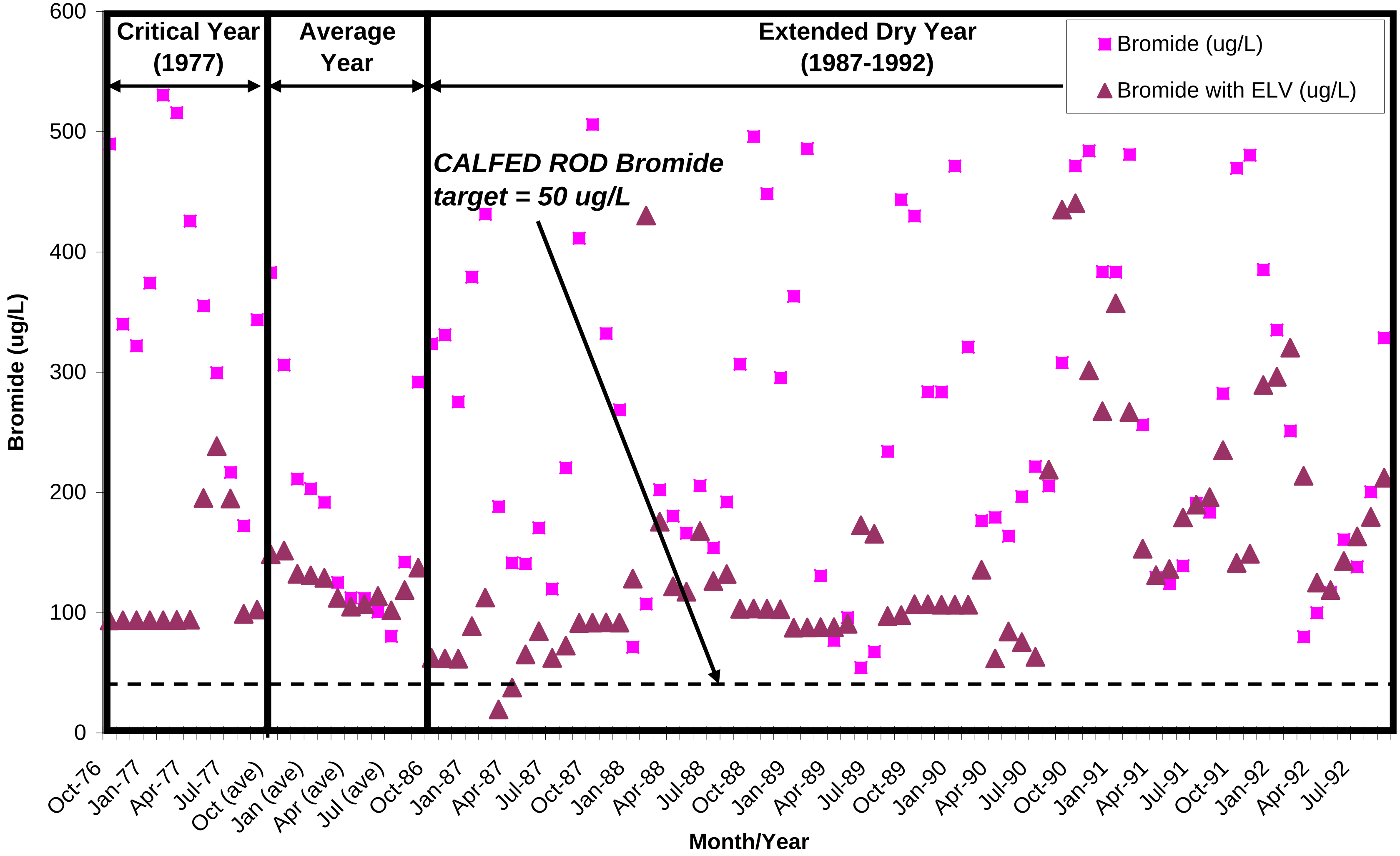


Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

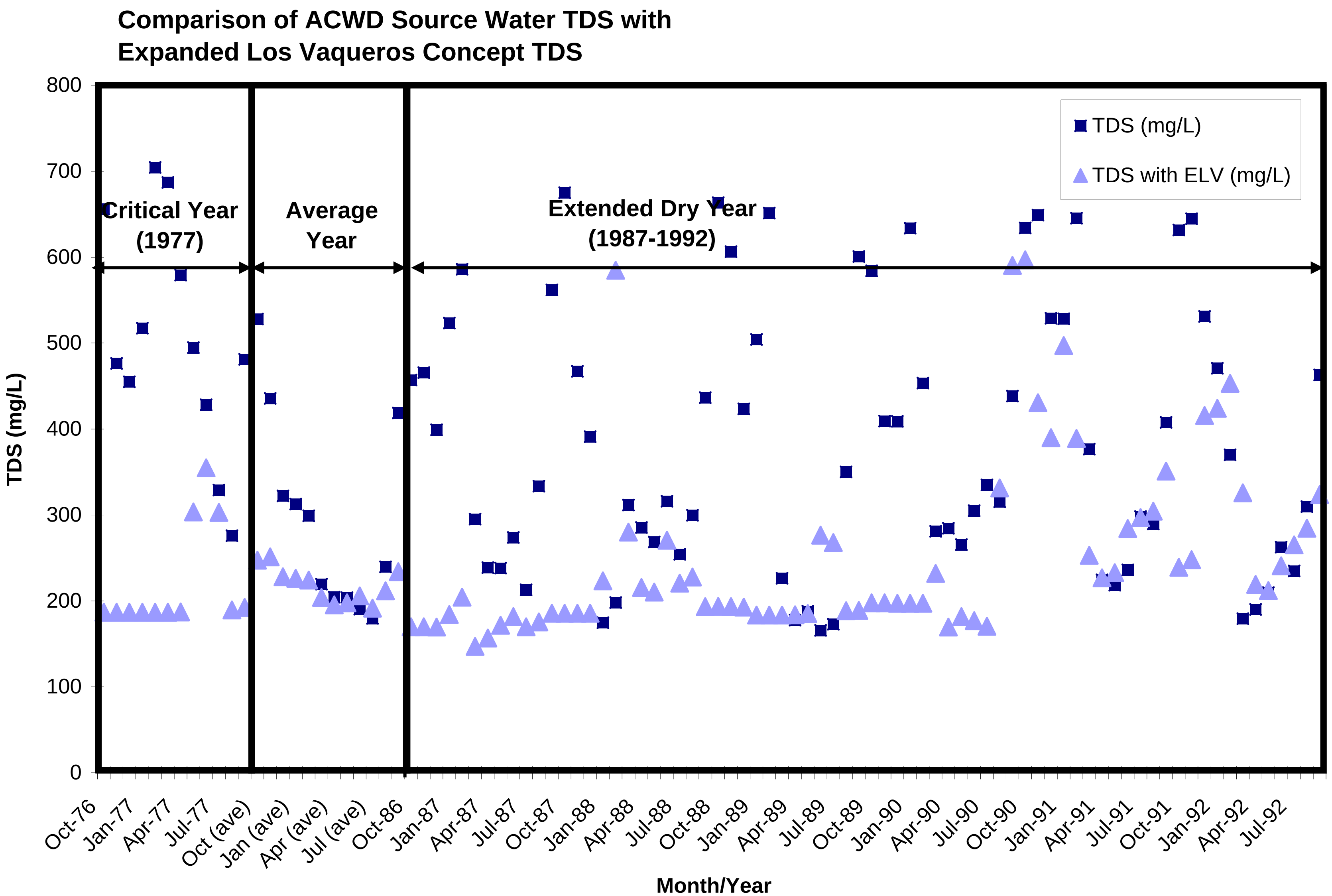
Comparison of ACWD Source Water Bromide with Expanded Los Vaqueros Concept Bromide



Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)



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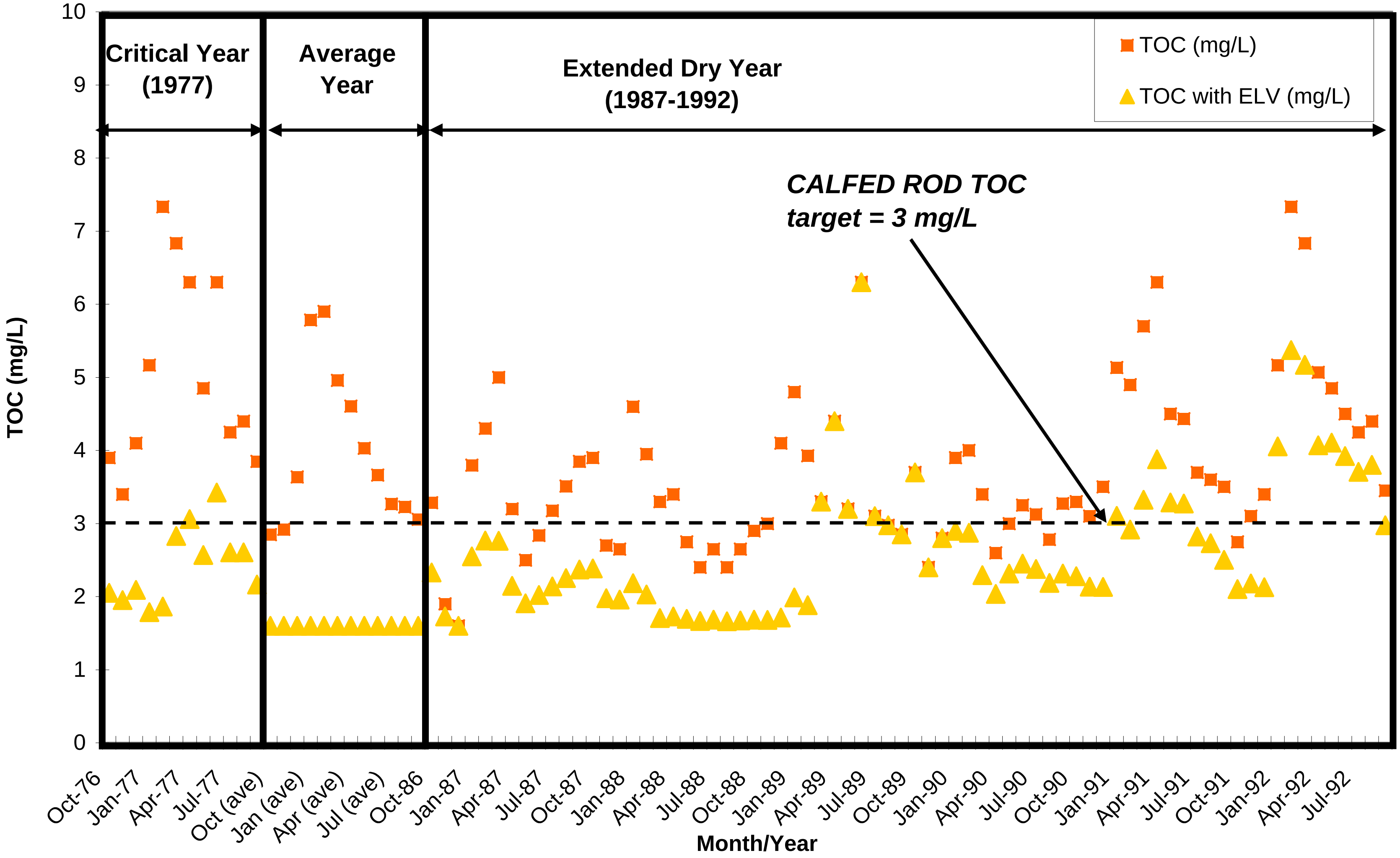
Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

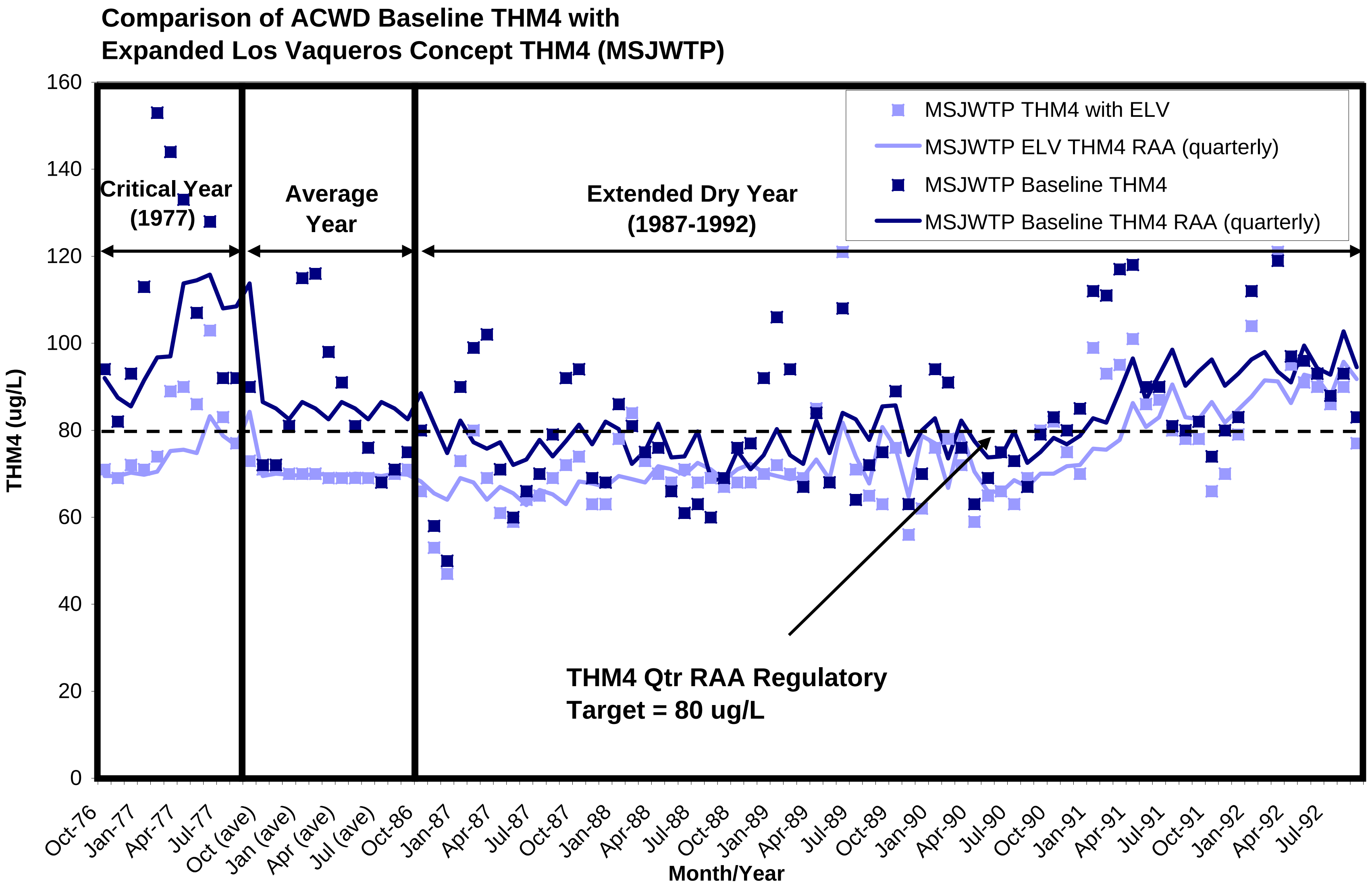
Comparison of ACWD Source Water TOC with Expanded Los Vaqueros Concept TOC



Note: ELV water quality is the flow-weighted mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

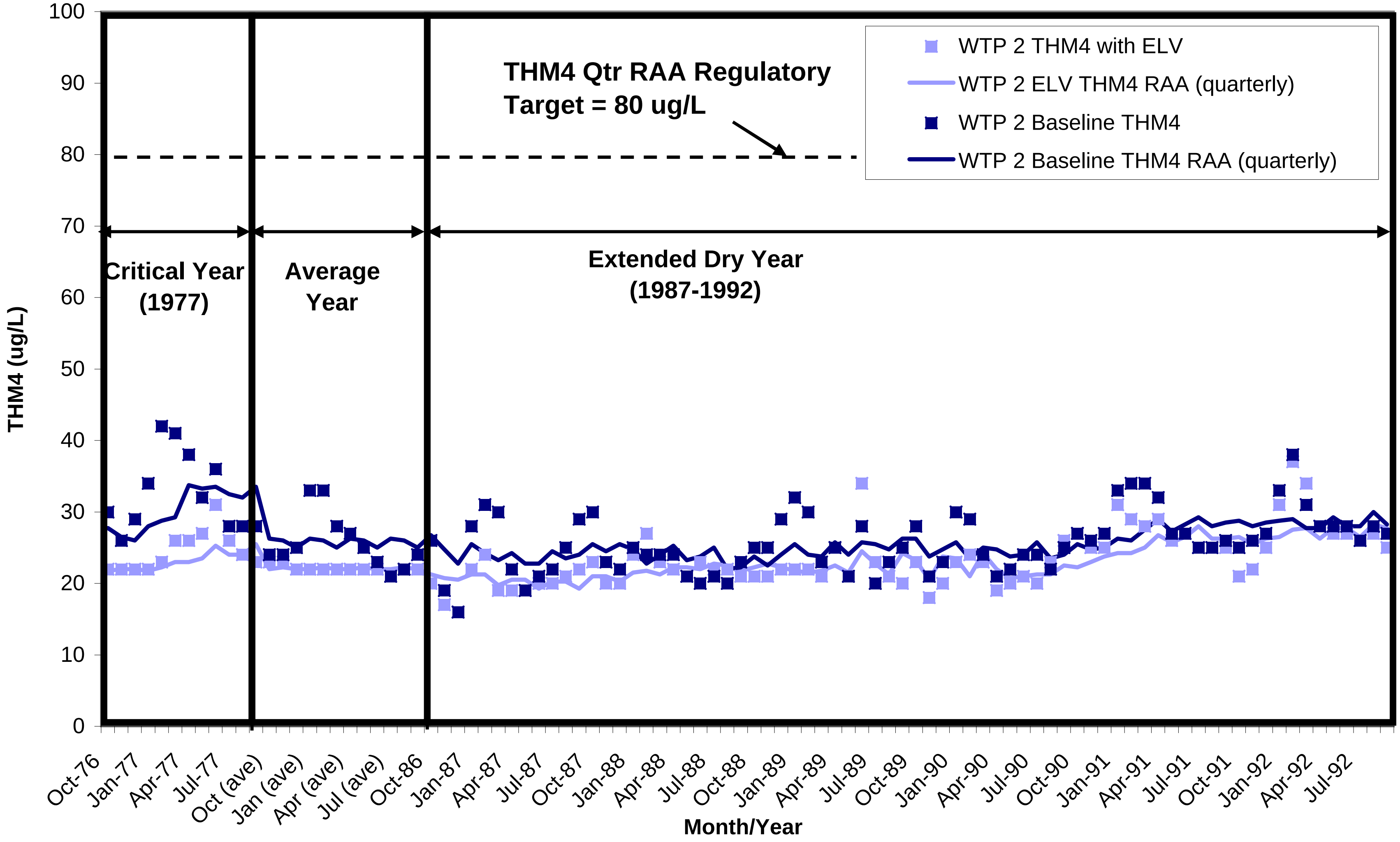


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production for WTP 1 .

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of ACWD Baseline THM4 with Expanded Los Vaqueros Concept THM4 (WTP 2)

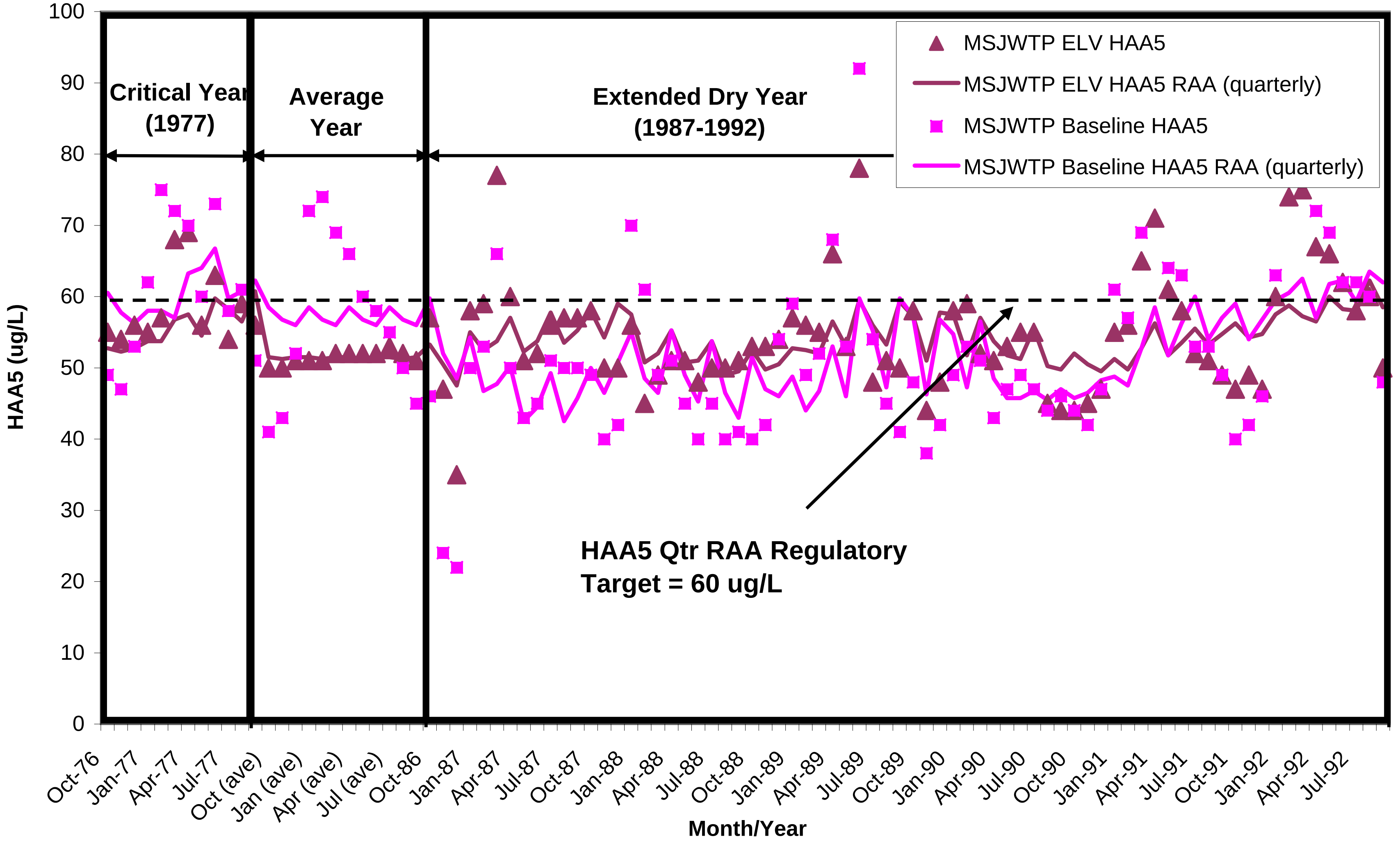


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production for WTP 2 treatment.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of ACWD Baseline HAA5 with Expanded Los Vaqueros HAA5 (MSJWTP)

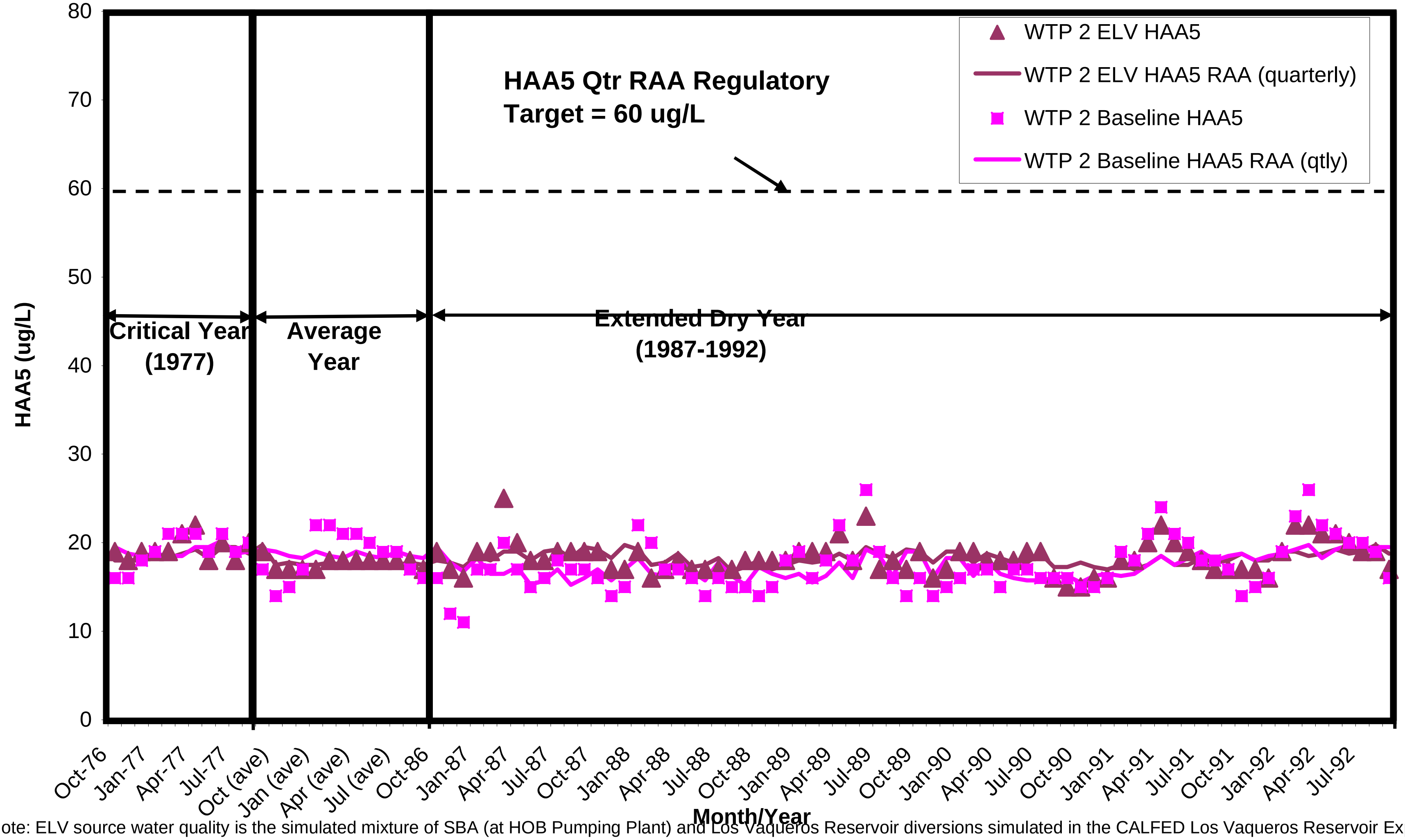


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production for WTP 1 .

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of ACWD Baseline HAA5 with Expanded Los Vaqueros HAA5 (WTP 2)

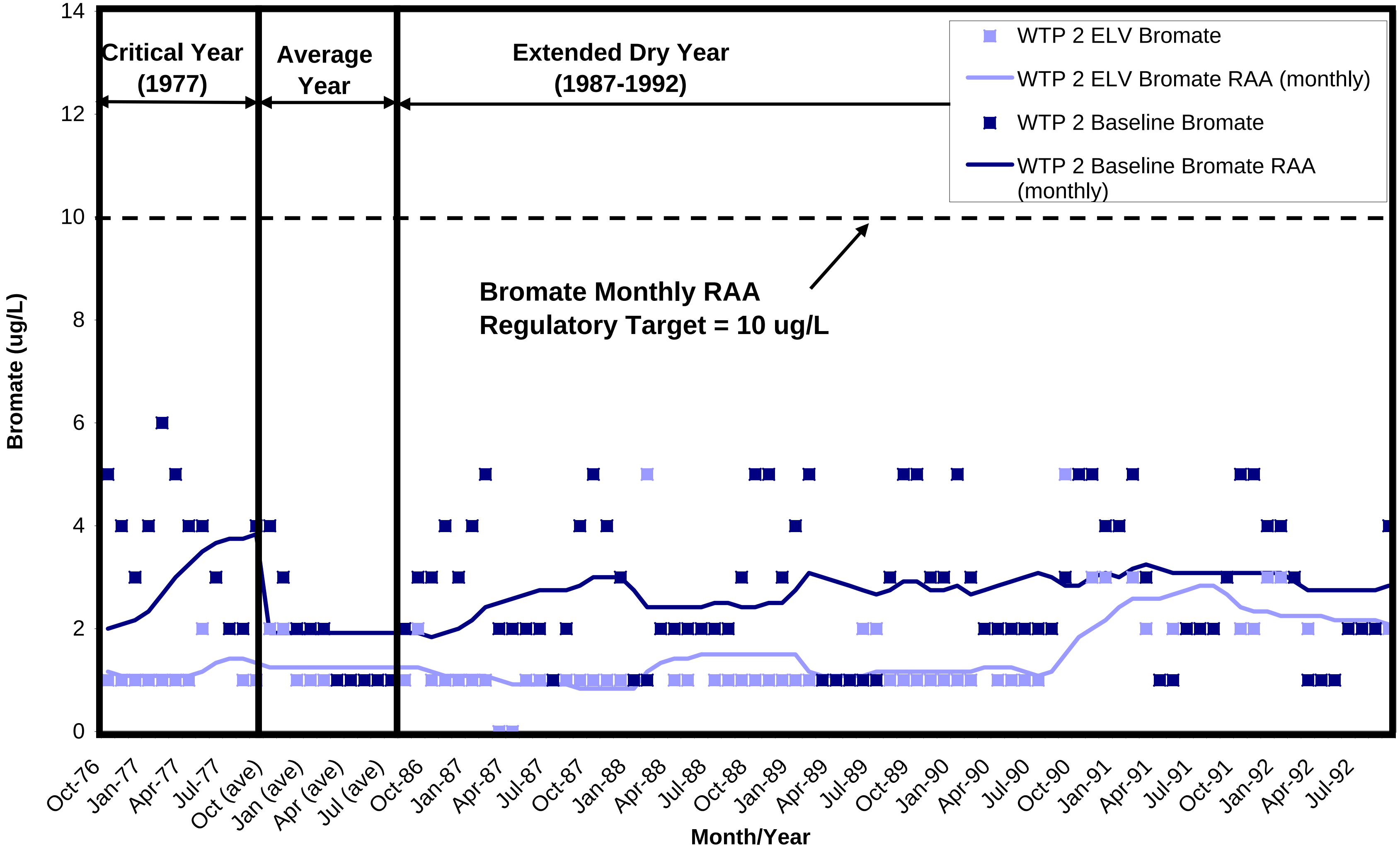


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production for WTP 2.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of ACWD Baseline Bromate with Expanded Los Vaqueros Concept Bromate (WTP 2)

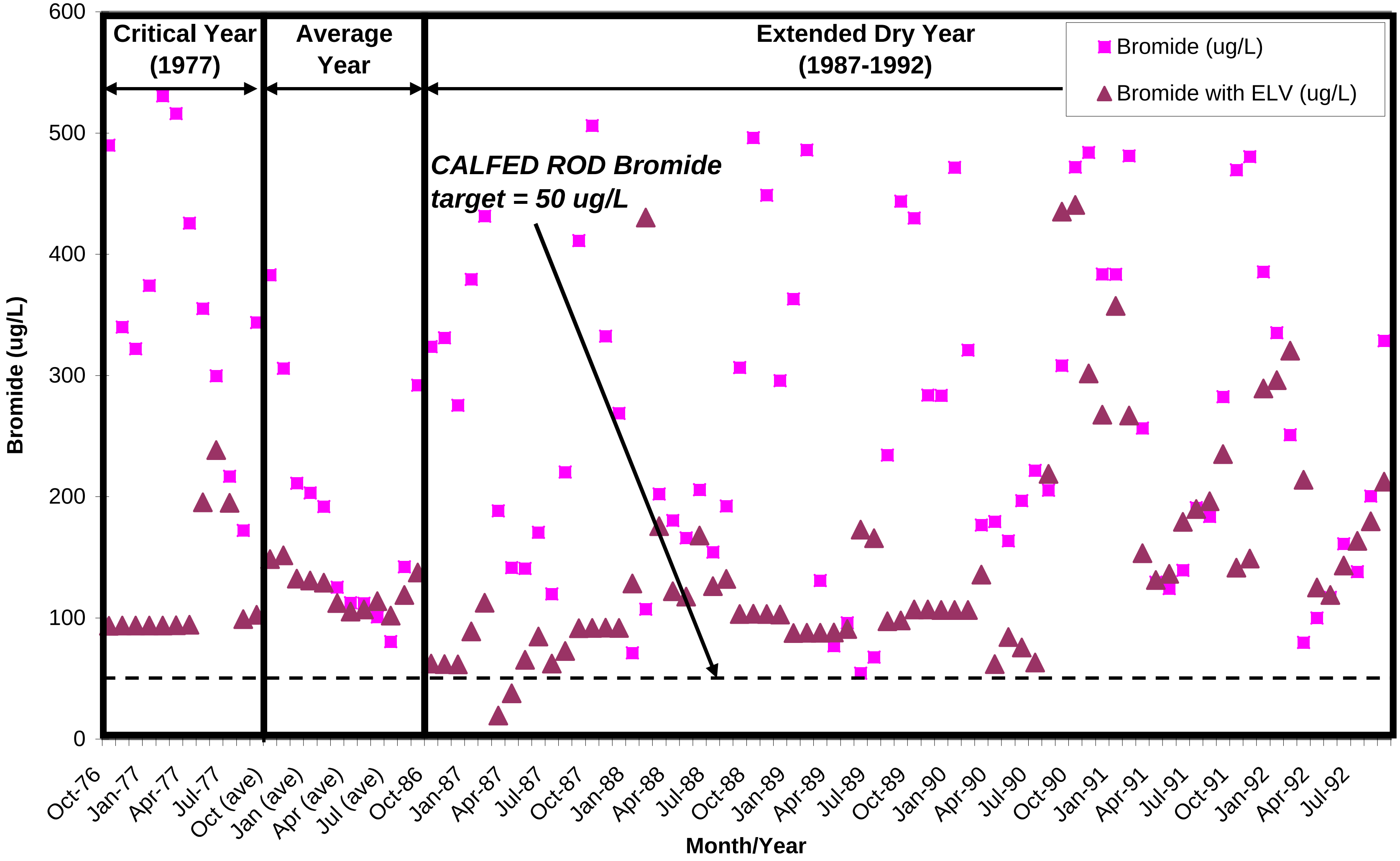


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production for WTP 2.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of SCVWD Source Water Bromide with Expanded Los Vaqueros Concept Bromide

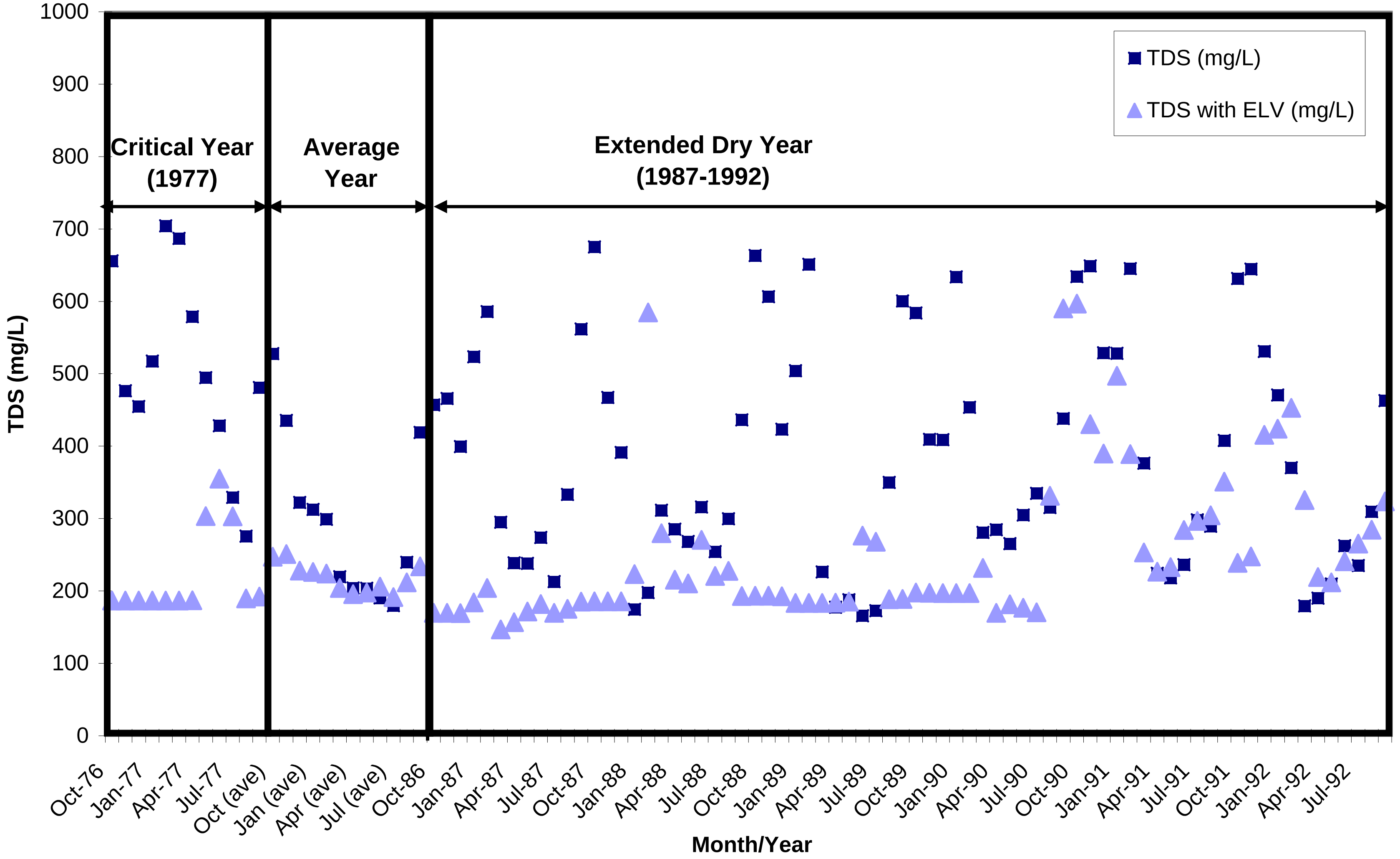


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

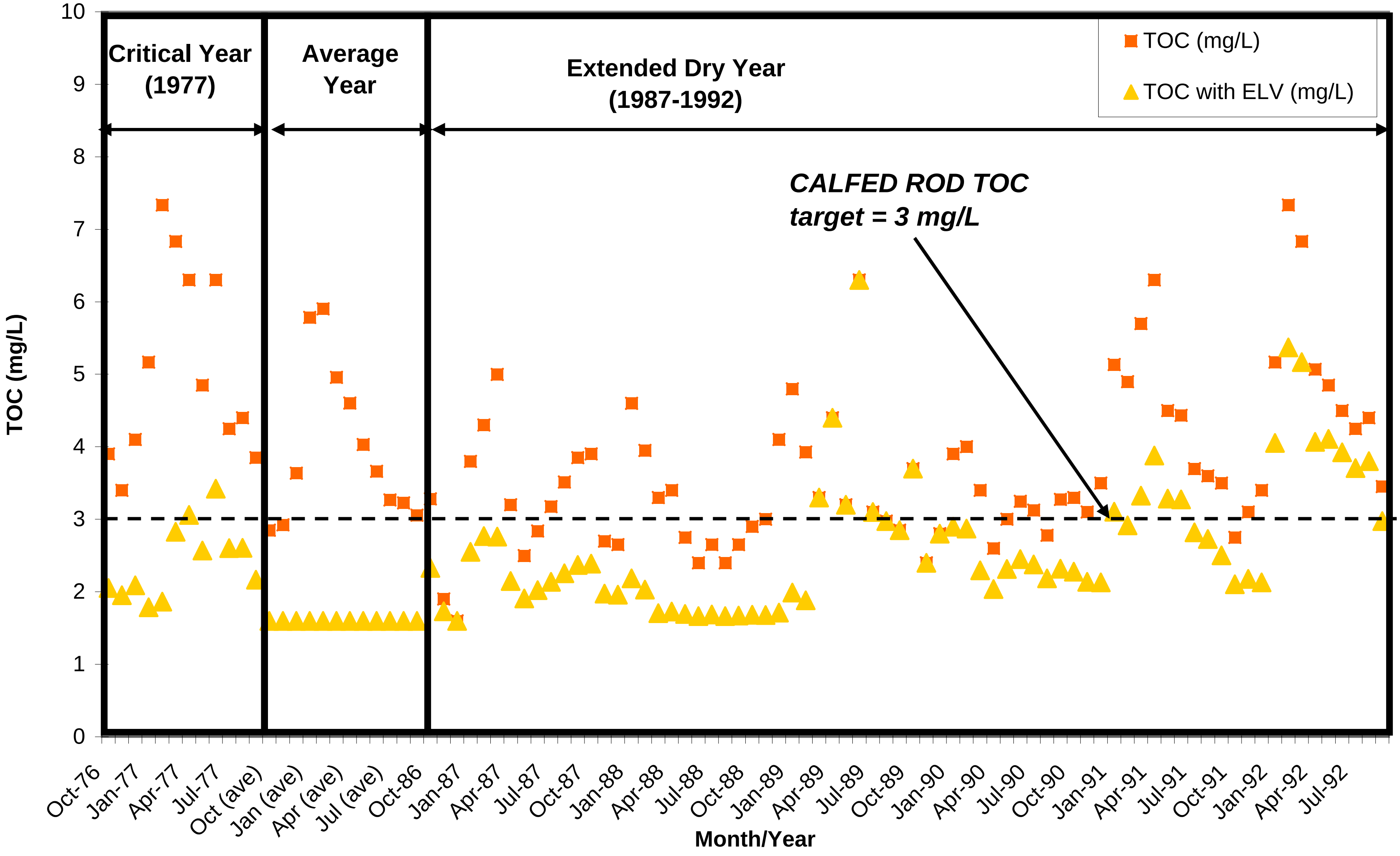
Comparison of SCVWD Source Water TDS with Expanded Los Vaqueros Concept TDS



Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept
(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of SCVWD Source Water TOC with Expanded Los Vaqueros Concept TOC

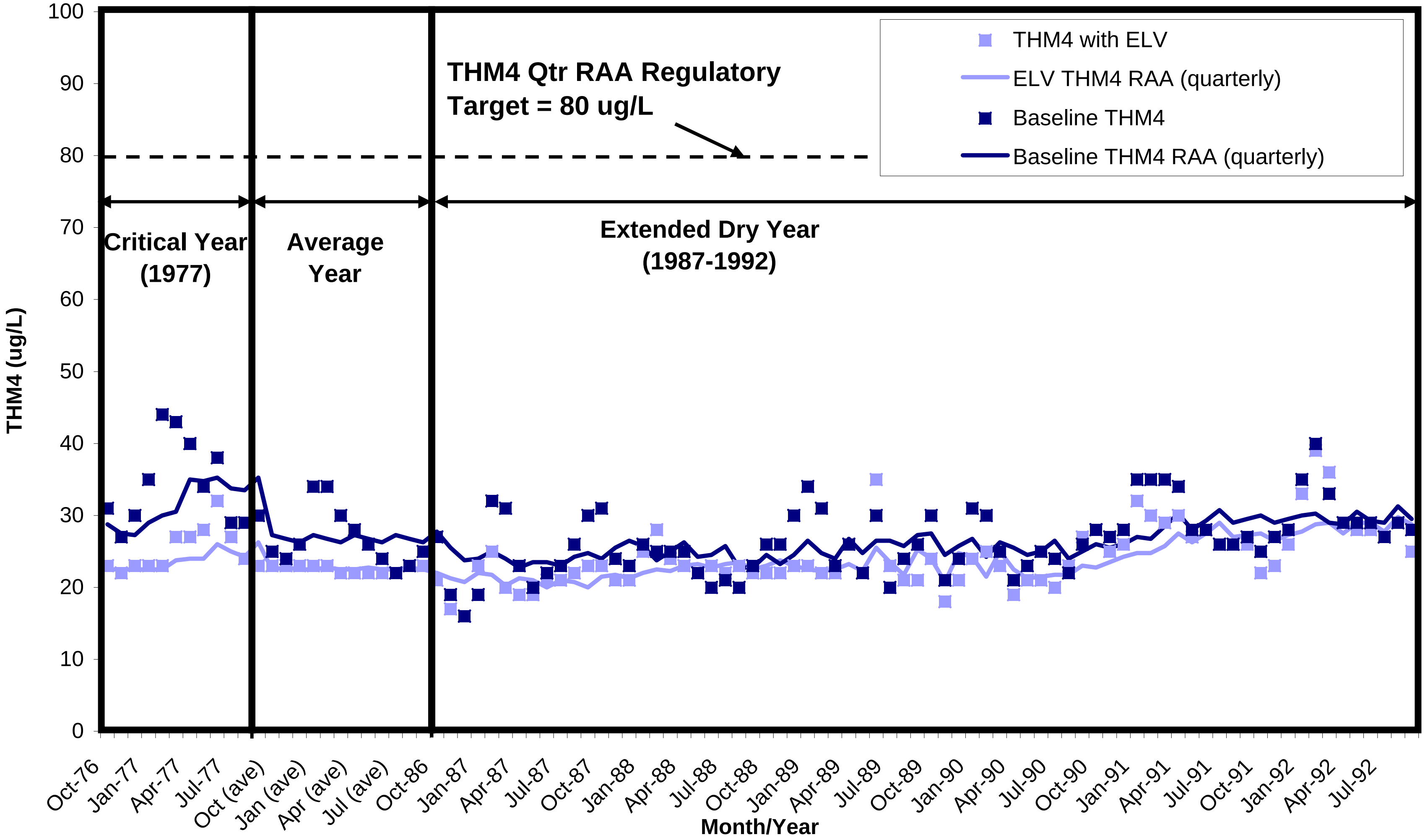


Note: ELV water quality is the flow-weighted mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

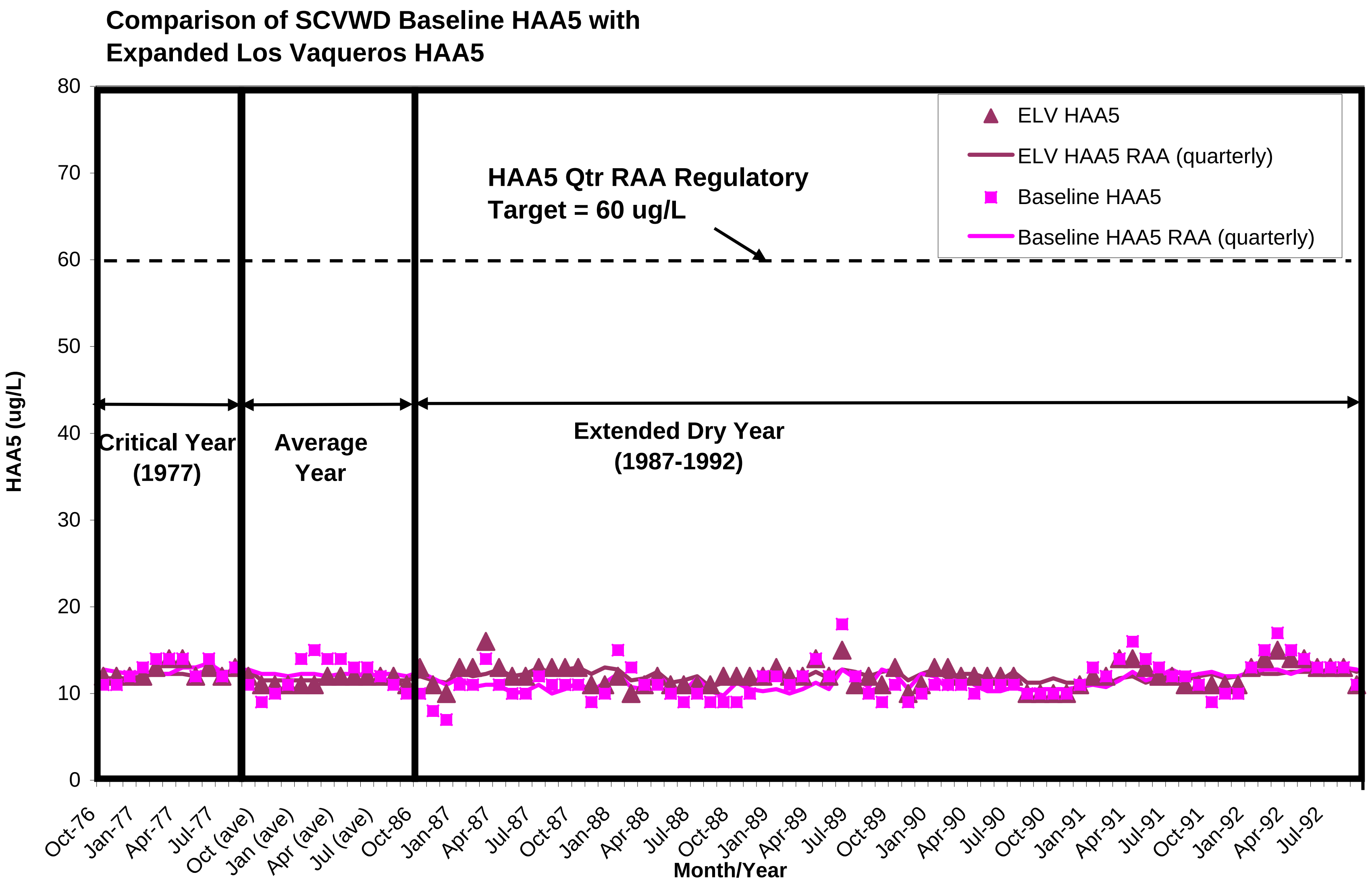
Comparison of SCVWD Baseline THM4 with Expanded Los Vaqueros Concept THM4



Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming settled water ozonation.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)



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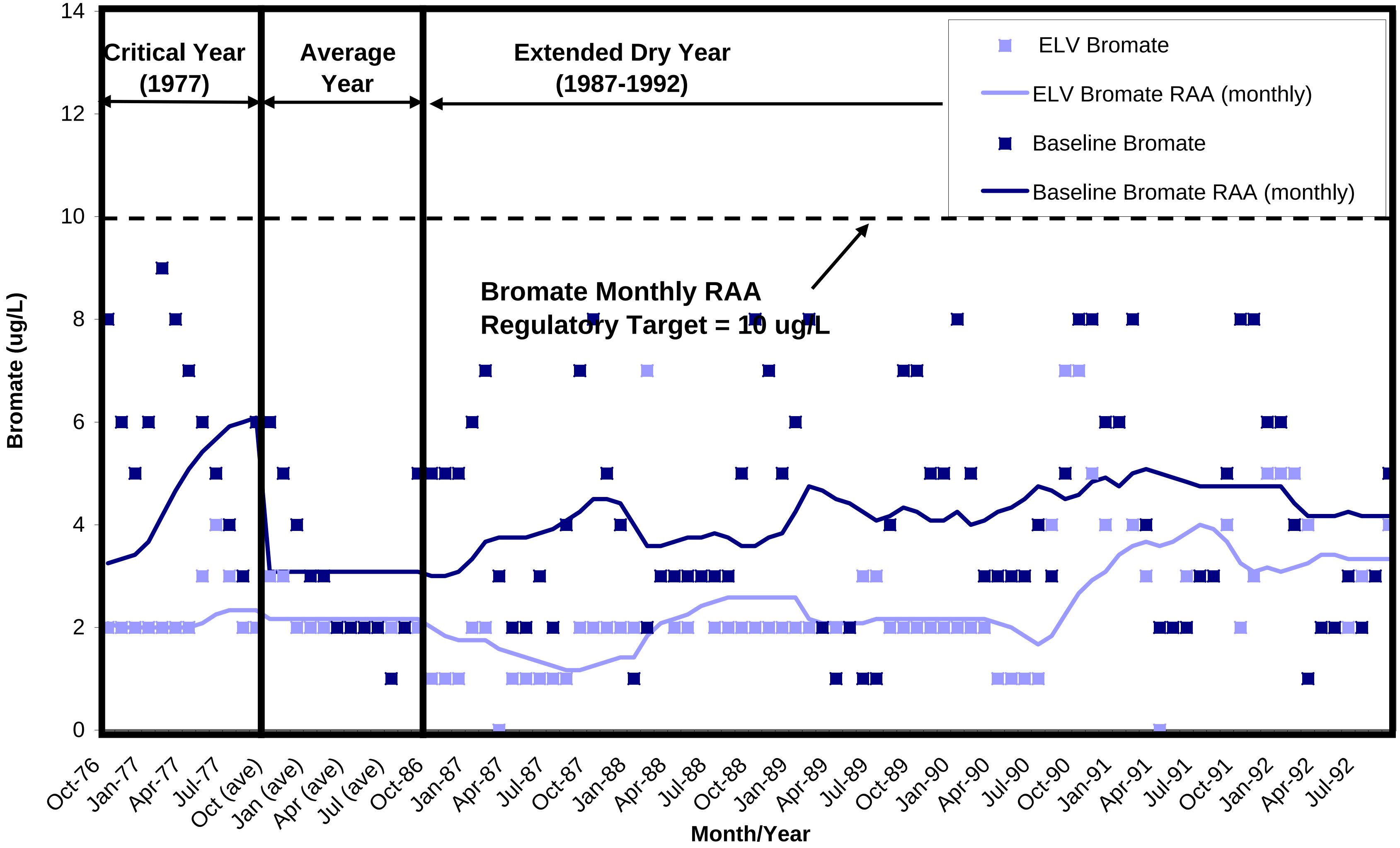
Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of SCVWD Baseline Bromate with Expanded Los Vaqueros Concept Bromate



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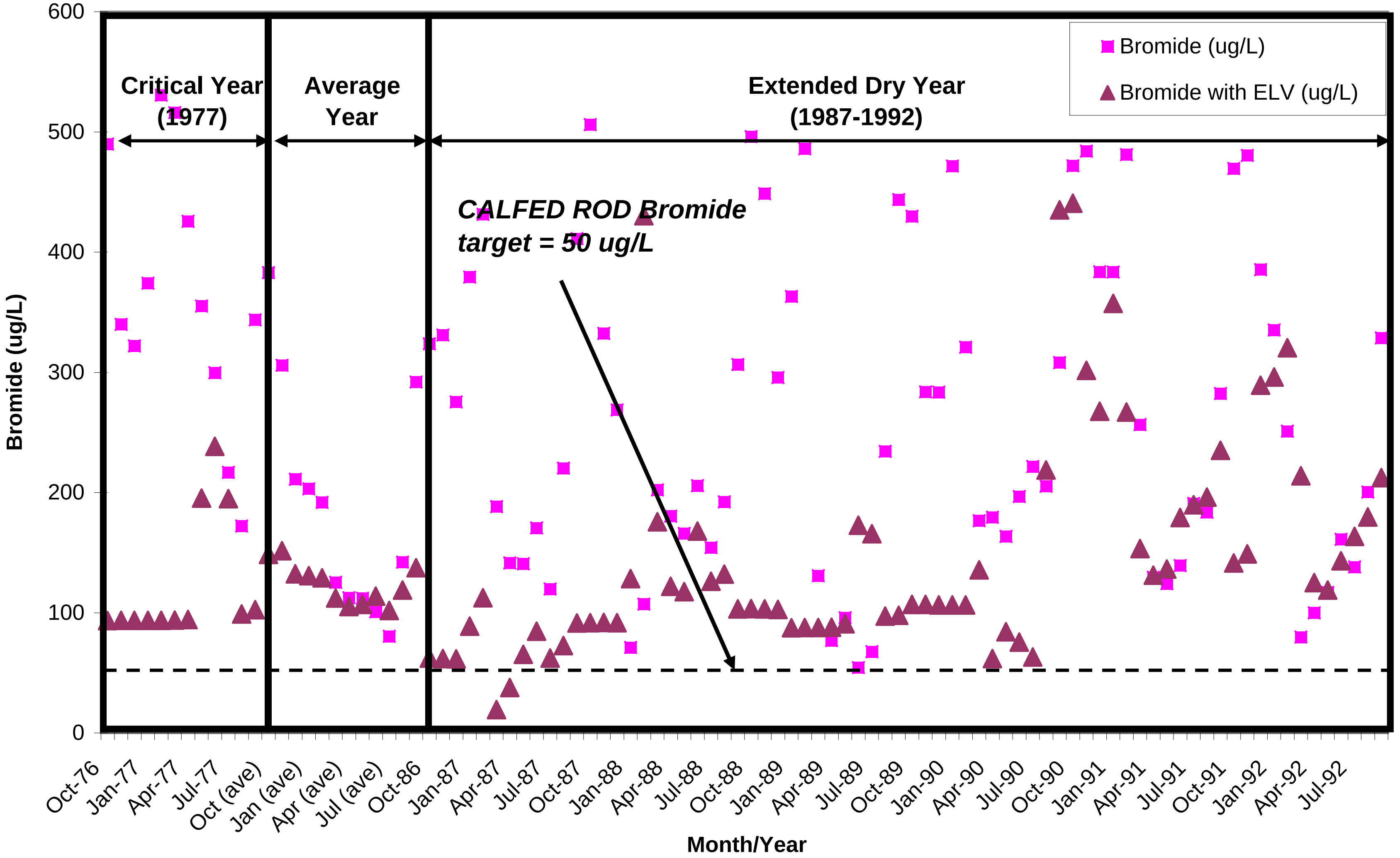
Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of Zone 7 Source Water Bromide with Expanded Los Vaqueros Concept Bromide

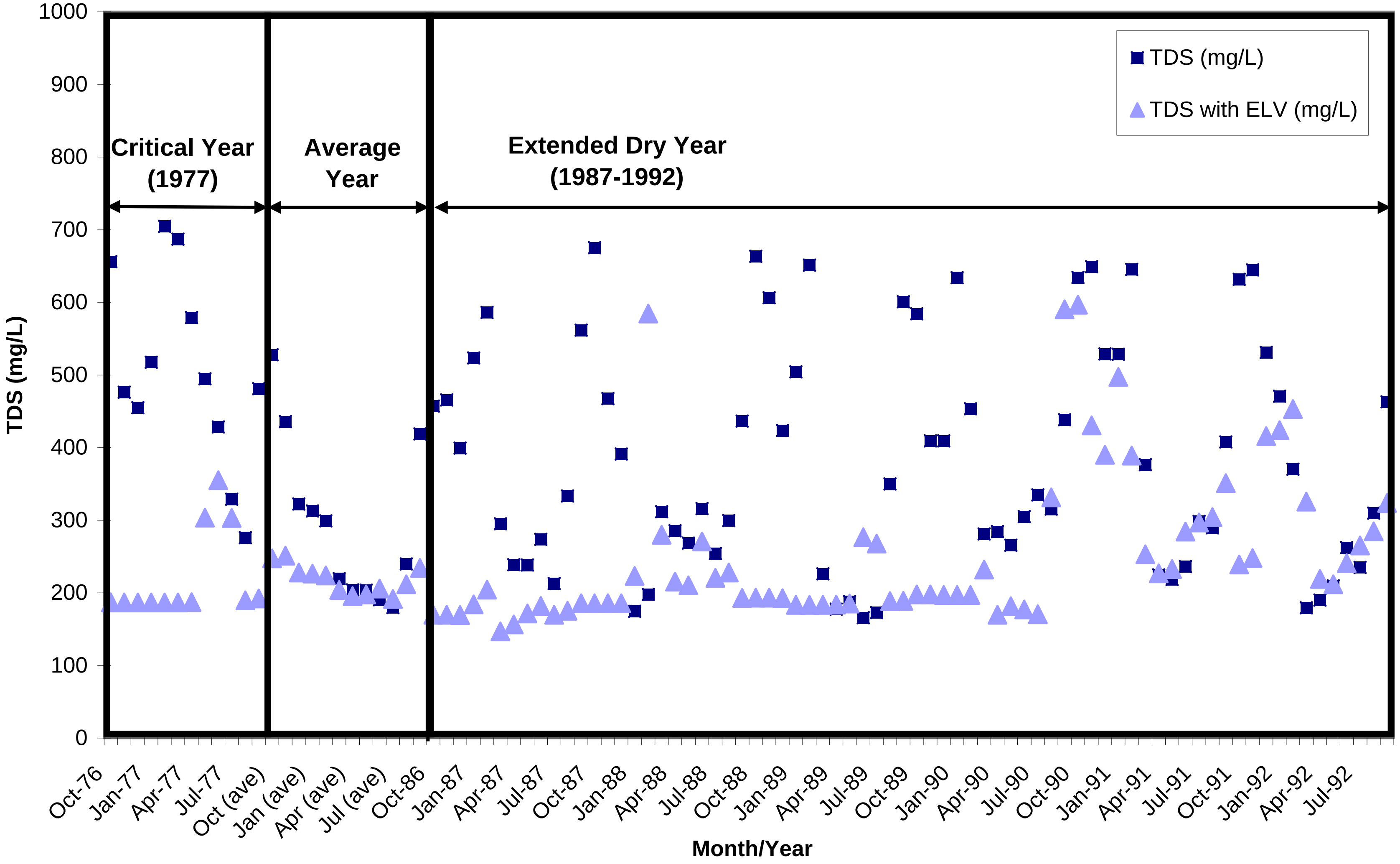


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of Zone 7 Source Water TDS with Expanded Los Vaqueros Concept TDS

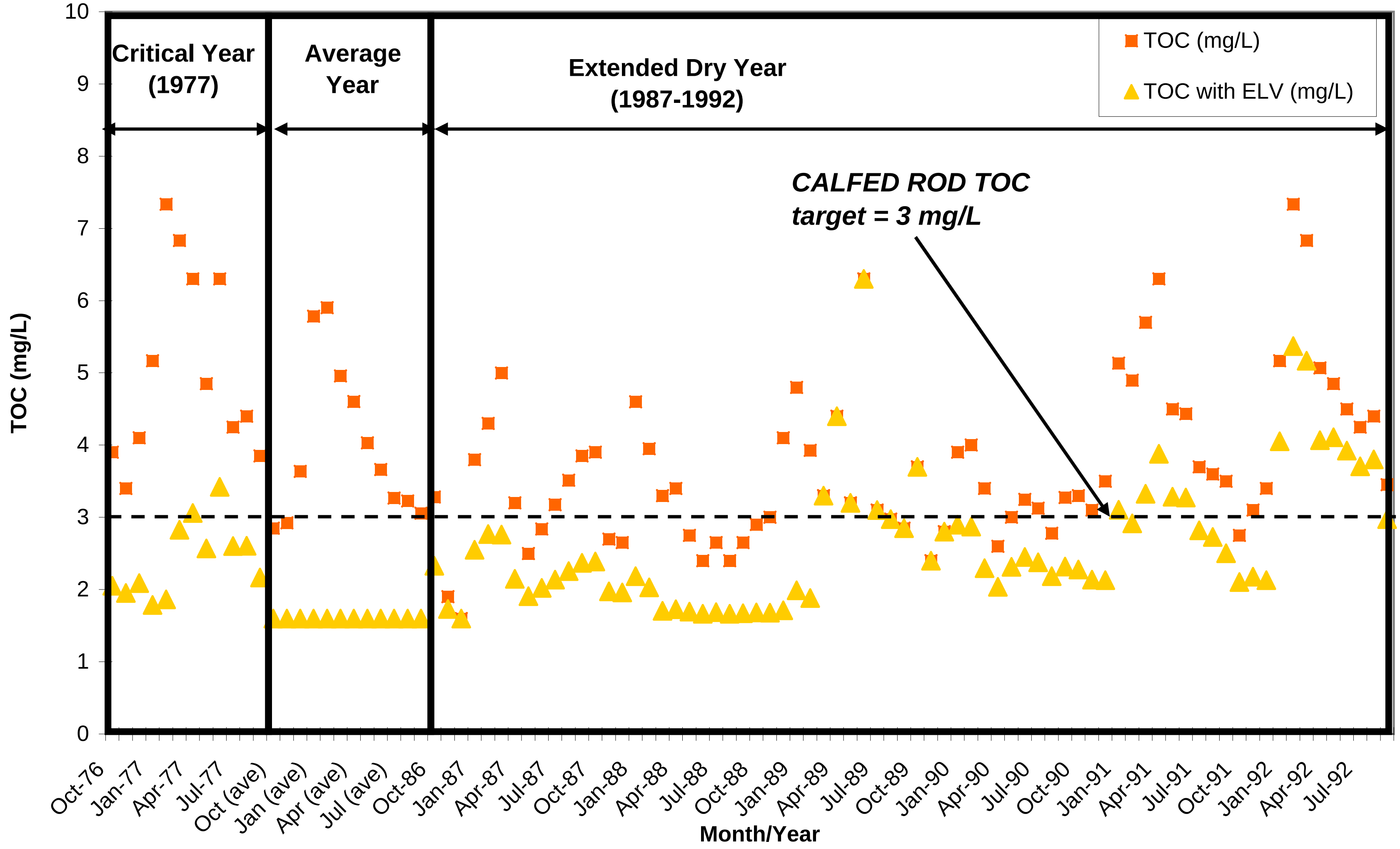


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

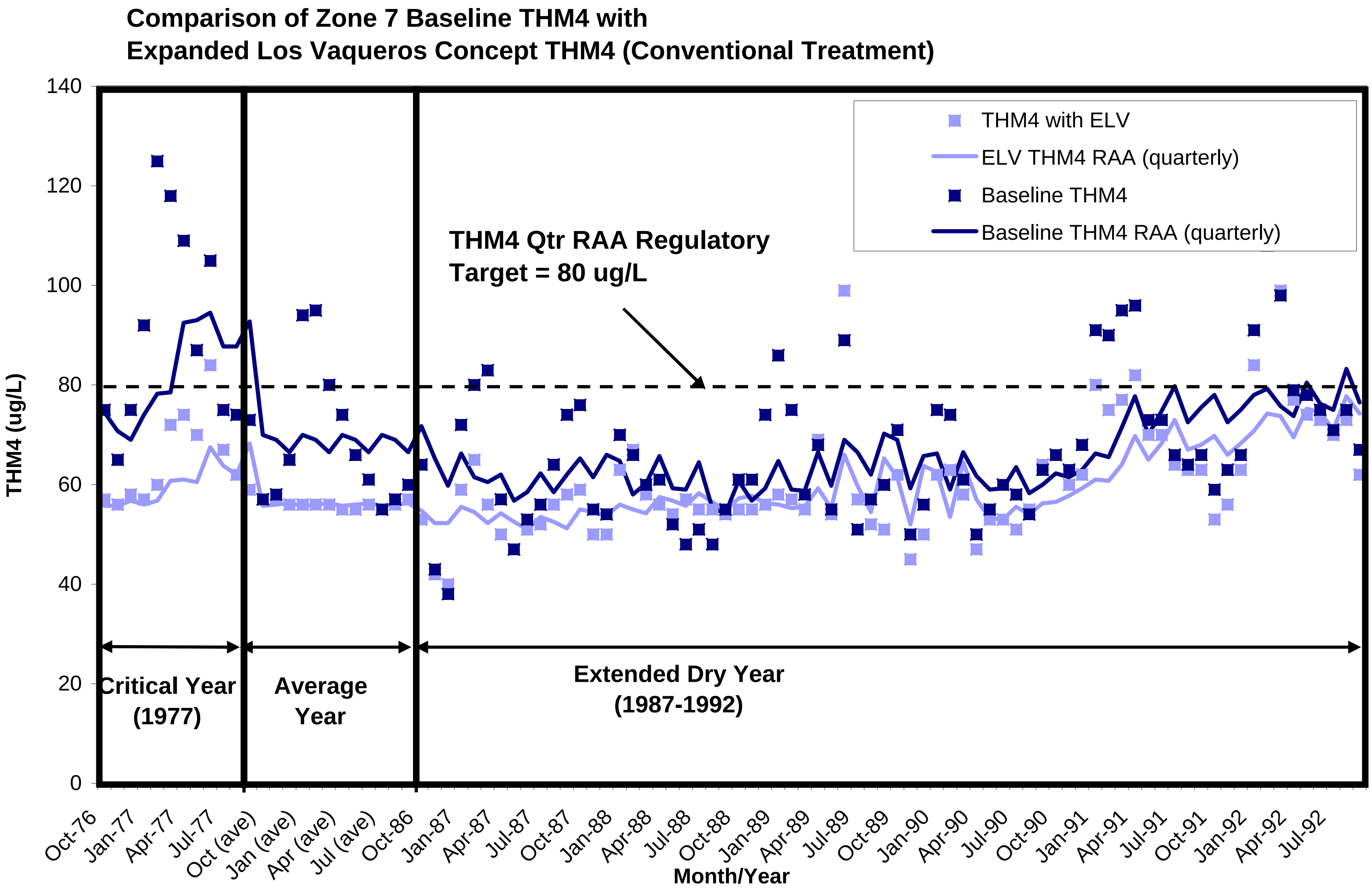
Comparison of Zone 7 Source Water TOC with Expanded Los Vaqueros Concept TOC



Note: ELV water quality is the flow-weighted mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

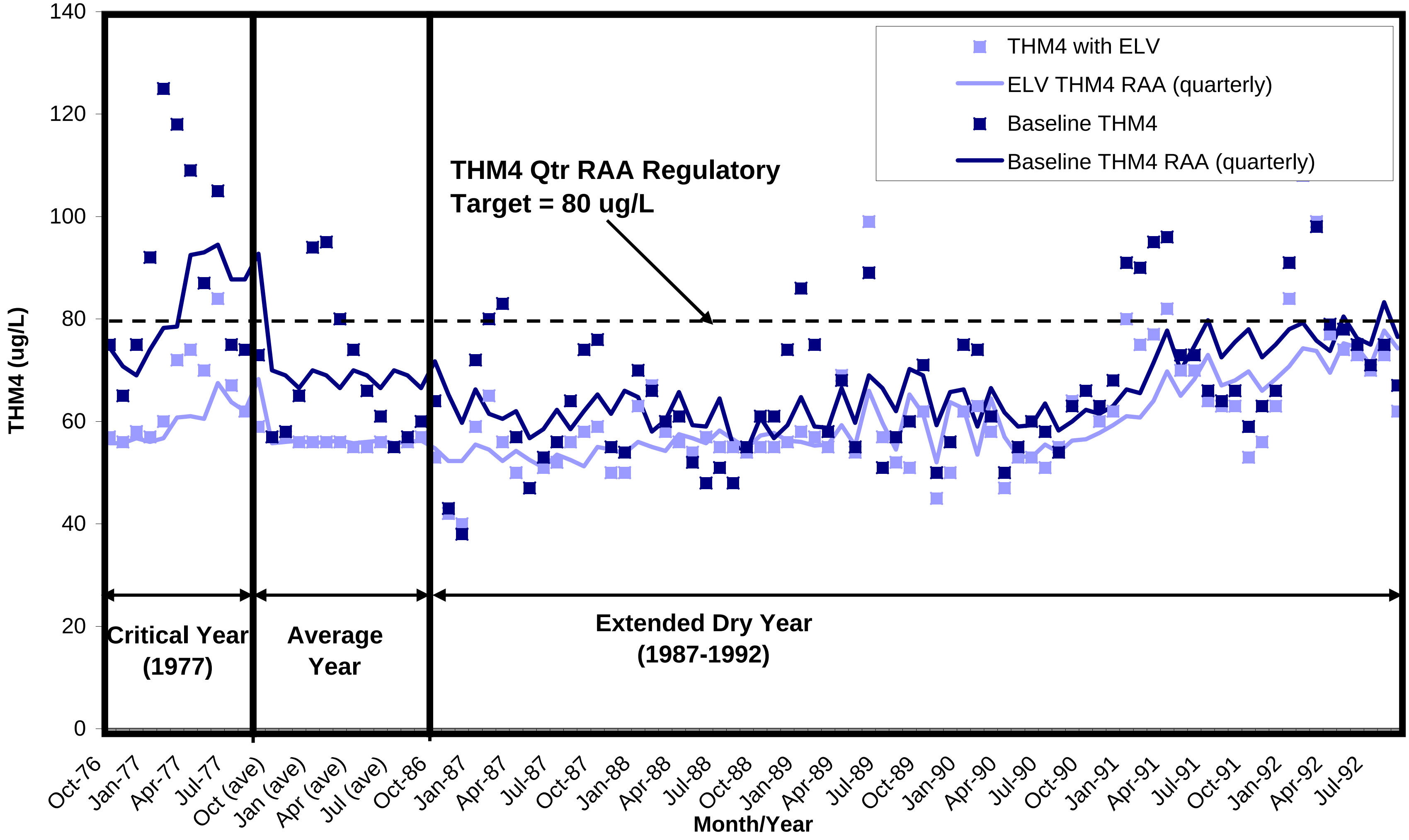


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of Zone 7 Baseline THM4 with Expanded Los Vaqueros Concept THM4 (UF & Conventional Treatment)

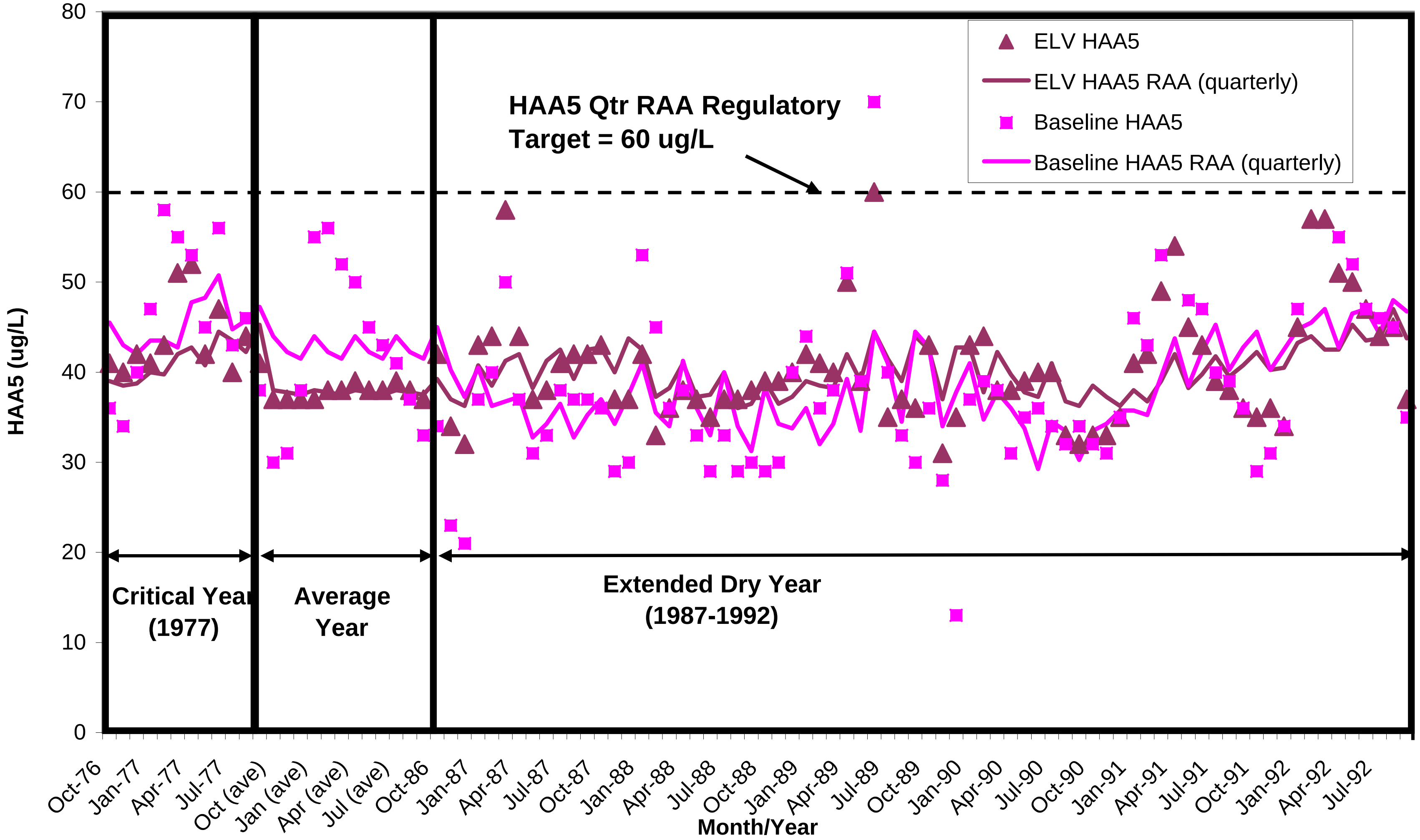


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 8:12 blend of UF:conventionally treated supplies.

Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of Zone 7 Baseline HAA5 with Expanded Los Vaqueros HAA5 (Conventional Treatment)



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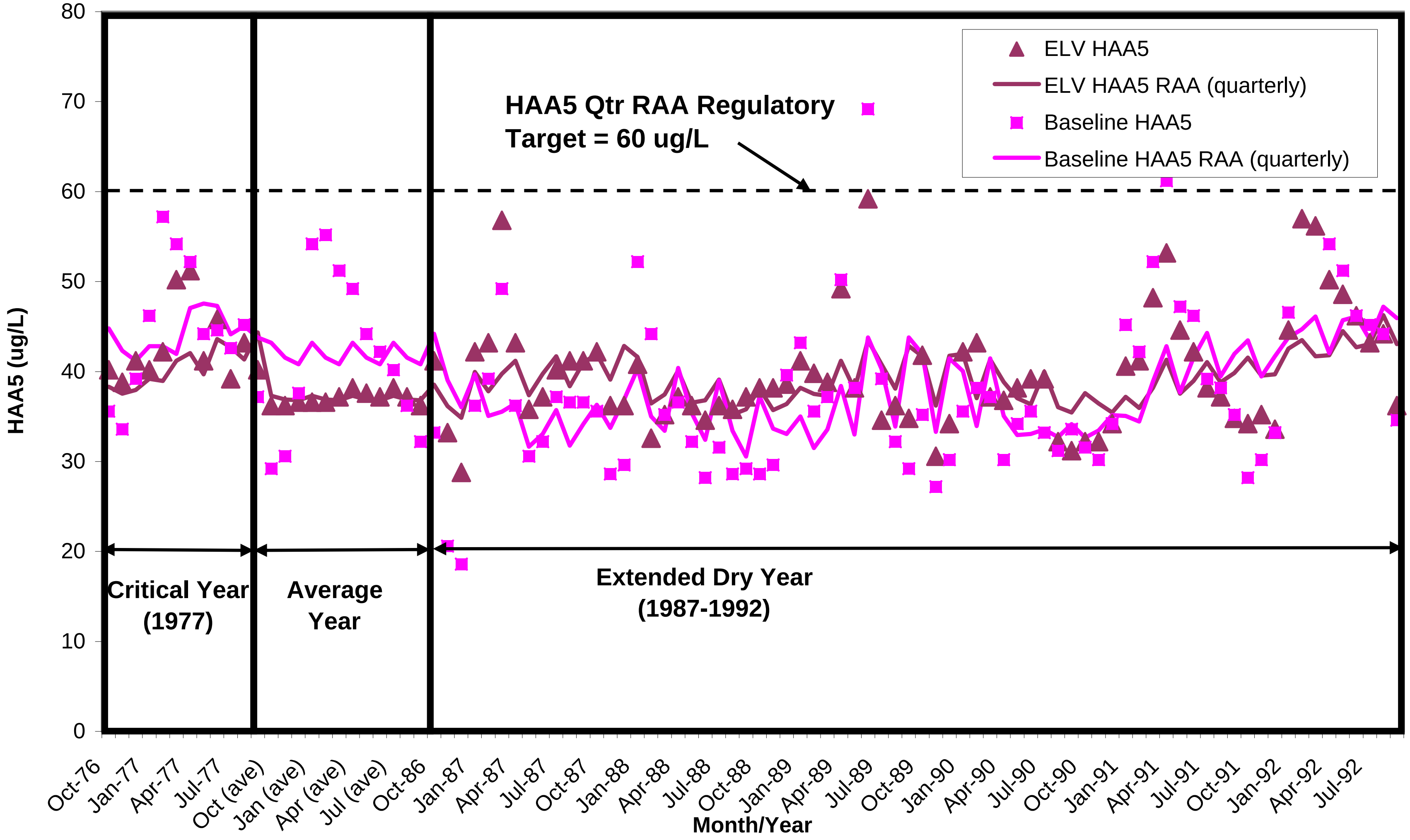
Los Vaqueros Reservoir Expansion Concept

(Multipurpose Scenario, 500 TAF, 1,750 cfs diversion)

Comparison of Zone 7 Baseline HAA5 with Expanded Los Vaqueros HAA5 (UF & Conventional Treatment)



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G4 Water Recycling

G4 Recycled Water Concepts

DESCRIPTION

Twenty-six recycled water concepts are currently being evaluated in the Bay Area Regional Water Quality and Water Supply Reliability Program. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction of potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts.

Recycled Water Concepts Summary

Extended Dry Year Supply	Up to 97,000 AFY
Average Year Water Quality Supply	0 AFY
Cost ($2005)	
Capital Cost	Up to $840 M
O&M Cost	Up to $22 M/Yr
Unit Cost	$1,500/AF

Potential Owning Agency
All

Potential Partners
All

Project Facilities for Recycled Water Concepts

Facility	Notes
ACWD/USD (1,650 AFY)	
Irvington Pump Station Satellite Plant 1.5 MGD • Membrane Bioreactor: (4) 375,000-gal basins • Micro or Ultra Filtration • UV Disinfection • Discharge	The pump station would be modified to treat wastewater to tertiary standards as outlined in Title 22 Recycled Water requirements.
Storage • 2 MG Storage Tank	An elevated storage tank in Fremont would provide equalization and serve peak demands that exceed capacity of the facility.
Pipelines • Distribution pumps: 2 on duty, 1 standby • Distribution piping (18-24”)	
Burlingame (up to 4,400 AFY)	
Burlingame Wastewater Treatment Plant • Tertiary treatment plant (4 MGD)	Existing plant would be upgraded to produce Title 22 recycled water.
Pipelines • Distribution piping	Piping alignments assumed to follow public rights of way.
CCCSD – Industrial (17,920 AFY)	
CCCSD Martinez Wastewater Treatment Plant • U.V. Filtration	Treats water to secondary standards.
CCCSD Biofor Reactor • 16 MGD	Removes ammonia for industrial use
CCCSD Recycled Water Filter Plant • Storage (2,500 gal) • Coagulant metering pumps	Treats water to Title 22 Standards
Clearwell • Install baffles	
Pipelines • Install cathodic protection for 42-inch pipe to Tesoro • 2-mile pipe to Rhoida	Pipeline assumed to follow right of way.

Facility	Notes
CCCSD – Irrigation (3,000 AFY)	
CCCSD Martinez Wastewater Treatment Plant • U.V. Filtration	Treats water to secondary standards.
CCCSD Recycled Water Filter Plant	Existing plant produces Title 22 Recycled Water
Pipelines • Distribution piping	Piping alignments assumed to follow public rights of way.
Coastside County Water District (580 AFY)	
SAM WWTP • Coagulation/Flocculation • Filtration • Increased Disinfection (UV or Chlorine)	The current WWTP needs to be upgraded from secondary to tertiary treatment. Some facilities in the current WWTP (such as an unused sedimentation basin) may be converted to serve some of the tertiary treatment needs.
Storage • 250,000 gal	Storage will take place in existing, unused 250,000 gal aeration basin.
Recycled Water Pump Station • Vertical turbine pumps	Pump station will pump recycled water to golf courses (3 miles) and cemetery (5 miles).
Booster Pump Stations	
Distribution • Distribution pipelines	10-inch diameter PVC pipe and 8-inch diameter steel pipe will deliver water to users. It is assumed that pipeline alignments would follow public rights-of way. These will constitute the major capital cost for the project.
Expanded DDSD (1,600 AFY)	
DDSD Recycled Water Facility • No modifications needed	The current RW Facility has capacity to treat 12.4 MGD while at the present it treats 7.6 MGD, therefore no plant modifications are needed.
Distribution • Distribution pipelines	It is assumed that pipeline alignments would follow public rights-of way. These will constitute the major capital cost for the project.
Expanded DERWA (1,430 AFY)	
DSRSD Recycled Water Plant Upgraded RW Facilities including Filtration, UV, and additional chemical disinfection	RW facilities to be expanded in Phase II from 9.7 MGD to 16.5 MGD peak flow capacity.
Pipelines • Additional pipelines and transmission to customers	It is assumed that pipeline alignments would follow public rights-of way.
Expanded San Ramon Valley (1,900 AFY)	
Recycled Water facilities • DSRSD	
Distribution System Improvements • New Reservoirs • Upgrades to existing Pump Station • Pipeline extensions	Needed to expand system delivery It is assumed that pipeline alignments will follow public rights-of-way
Expanded East Bayshore (up to 2,016 AFY)	
Recycled Water facilities • EBMUD Oakland Plant	Increase treatment capacity
Distribution System Improvements • Addition distribution lines • Customer Retrofits	It is assumed that pipeline alignments will follow public rights-of-way.

Facility	Notes
Expanded South Bay Water Recycling (up to 16,800 AFY)	
Recycled Water facilities • San Jose/Santa Clara WPCP	Advanced treatment for salt and pollutant removal
Distribution System Improvements • New Reservoirs • Upgrades to existing Pump Station • Pipeline extensions into Santa Clara and Milpitas • Silver Creek Pipeline into Coyote Valley	Needed to improve system delivery reliability Needed to expand system delivery It is assumed that pipeline alignments will follow public rights-of-way
Franklin Canyon (336 AFY)	
Recycled Water facilities • Tertiary treatment facility	Requires upgrades to recycled water facility in Hercules to meet tertiary RW standards.
Wastewater Export Pipeline • New pipelines	Requires constructing export pipeline from Pinole to Hercules.
Pumping Station • New pump station	Pump station required to pump wastewater from Pinole to Hercules.
Pipelines • Distribution pipelines	It is assumed that pipeline alignments will follow public rights-of-way.
Lamorinda – Phase I (1,120 AFY)	
CCCSD Recycled Water Plant • No new facilities	CCCSD's plant has existing capacity to accommodate this project
Pipelines • New pipelines	It is assumed that pipeline alignments will follow public rights-of-way
Livermore Agricultural (2,660 AFY)	
LWRP • Increase RO Capacity by 1.42 MGD • Blend with existing recycled water	
Storage • South side storage required (1,782 AF)	To provide seasonal storage of recycled water
Distribution Piping • Additional piping to new users	
Livermore Municipal (2,240 – 2,800 AFY)	
• Wastewater Treatment Plant Upgrades • Distribution Piping	Need to confirm if the WWTP has capacity to expand recycled water production.
Millbrae (1,120 AFY)	
Millbrae Wastewater Treatment Plant • Tertiary treatment plant (1 MGD)	Existing plant would be upgraded to produce Title 22 recycled water
Pipelines • Distribution piping	Piping alignments assumed to follow public rights of way.
NCCWD/Pacifica (225 AFY)	
Calera Creek Water Recycling Treatment and Recycling Plant • 3.3 mgd tertiary treatment plant • New supply pumps in the Cascade Aerator structure	
Recycled Water Storage Tank • 400,000 gallon recycled water storage tank	To be located on San Francisco property above Sharp Park Golf Course
Pipelines • Transmission line from Treatment Plant to Storage Tank • Distribution Piping	Piping would be installed and operated by the North Coast County Water District, while the Calera Creek WRP would be responsible for supplying the Water District with tertiary treated water.

Facility	Notes
North Richmond Expansion (4,480 AFY)	
NRWRP • Additional treatment facilities, including MF/RO would be required to serve 3 MGD for boiler feedwater.	The NRWRP has excess capacity to accommodate an additional 1 MGD for the fourth cooling tower and irrigation customers.
Pipelines • Additional pipelines needed to convey water to fourth cooling tower, irrigation customers and boiler feed.	
Palo Alto Projects (1,830 – 4,677 AFY)	
Palo Alto Water Quality Control Plant • None	The treatment plant can be easily upgraded to produce a total of 8.0 MGD of recycled water. More extensive upgrades will be required if the total recycled water production exceeds 8.0 MGD.
Pipelines • Distribution piping	Piping alignments assumed to follow public rights of way.
Palo Alto RWQCP – Mountain View (1,480 – 1,860 AFY)	
Palo Alto Regional Water Quality Control Plant • Expanded RW Treatment Facilities	The treatment plant can be easily upgraded to produce 8.0 MGD of recycled water. More extensive upgrades will be required if the total recycled water production exceeds this amount.
Pipelines • Distribution piping	The project will replace an existing deteriorating pipeline to Shoreline Golf Course and to extend the pipeline to the Mountain View-Moffett Field area. Piping alignments will follow the levees near Palo Alto Refuse Center, along Matadero Creek and will be located adjacent to East Bayshore towards Mountain View (City of Palo Alto, 2004).
Redwood City (1,960 AFY)	
SBSA Treatment Plant (to be owned and operated by SBSA) • SBSA Plant Upgrades for production of Title 22 tertiary recycled water	A centralized recycled water production facility will be located at the SBSA site therefore eliminating the need to find new sites and minimizing environmental impacts. Most of the treatment facilities needed for recycled water already exist at the SBSA and only require modifications.
Pumping and Storage (to be owned and operated by Redwood City) • SBSA Pumping Station • SBSA Storage	SBSA has room for on-site storage Remote pumping and/or storage would be required for addition of adjacent communities.
Pipelines (to be owned and operated by Redwood City) • Transmission line and distribution piping	Piping alignments to follow public rights of way.
San Francisco Recycled Water Project (Up to 19,000 AFY)	
To be developed as part of ongoing studies by the SFPUC.	
San Leandro (1,060 AFY)	
San Leandro Reclamation Facility • New Tertiary Treatment facilities	
Distribution System • Pump Station • Distribution pipelines	It is assumed that pipeline alignments will follow public rights-of-way
Satellite EBMUD Recycled Water Project (20 AFY)	
Pilot Demonstration Plant	Located at UC Berkeley
Pipelines • Distribution Piping	To serve campus irrigation demands

Facility	Notes
South County Water Recycling (1,800 AFY)	
South County Regional Wastewater Authority (SCRWA) Storage • Two 3 MGD Storage Tanks	Additional review of supply and demand projections, design, limitations, and cost analyses are needed to better define the sizes and locations of these facilities.
Pump Stations • Two 3 Pump Stations	Additional review of supply and demand projections, design, limitations, and cost analyses are needed to better define the sizes and locations of these facilities.
Pipelines • Distribution piping (27,000 feet)	In general, piping alignments are assumed to follow current water utility alignments.
Stanford University (72 – 1,094 AFY)	
Stanford University's Local Recycled Water Projects • Seasonal storage, new distribution lines, storage tanks, pumping facilities, treatment plant. Stanford University's Participation in Regional Recycled Water Project • New distribution lines, storage tanks, pumping facilities, treatment plant.	Additional review of supply and demand projections, design, limitations, and cost analyses are needed to better define the sizes and locations of these facilities.
Pipelines • Distribution piping	In general, piping alignments are assumed to follow current water utility alignments.
Sunnyvale (1,470 AFY)	
Recycled Water facilities • Improvements at the Sunnyvale WPCP	Some minimal upgrades would be required.
Pipelines • Distribution Piping	Service would be provided to north Sunnyvale where current infrastructure can already convey recycled water. Other extensions would provide RW to outlying users. It is assumed that pipeline alignments will follow public rights-of-way

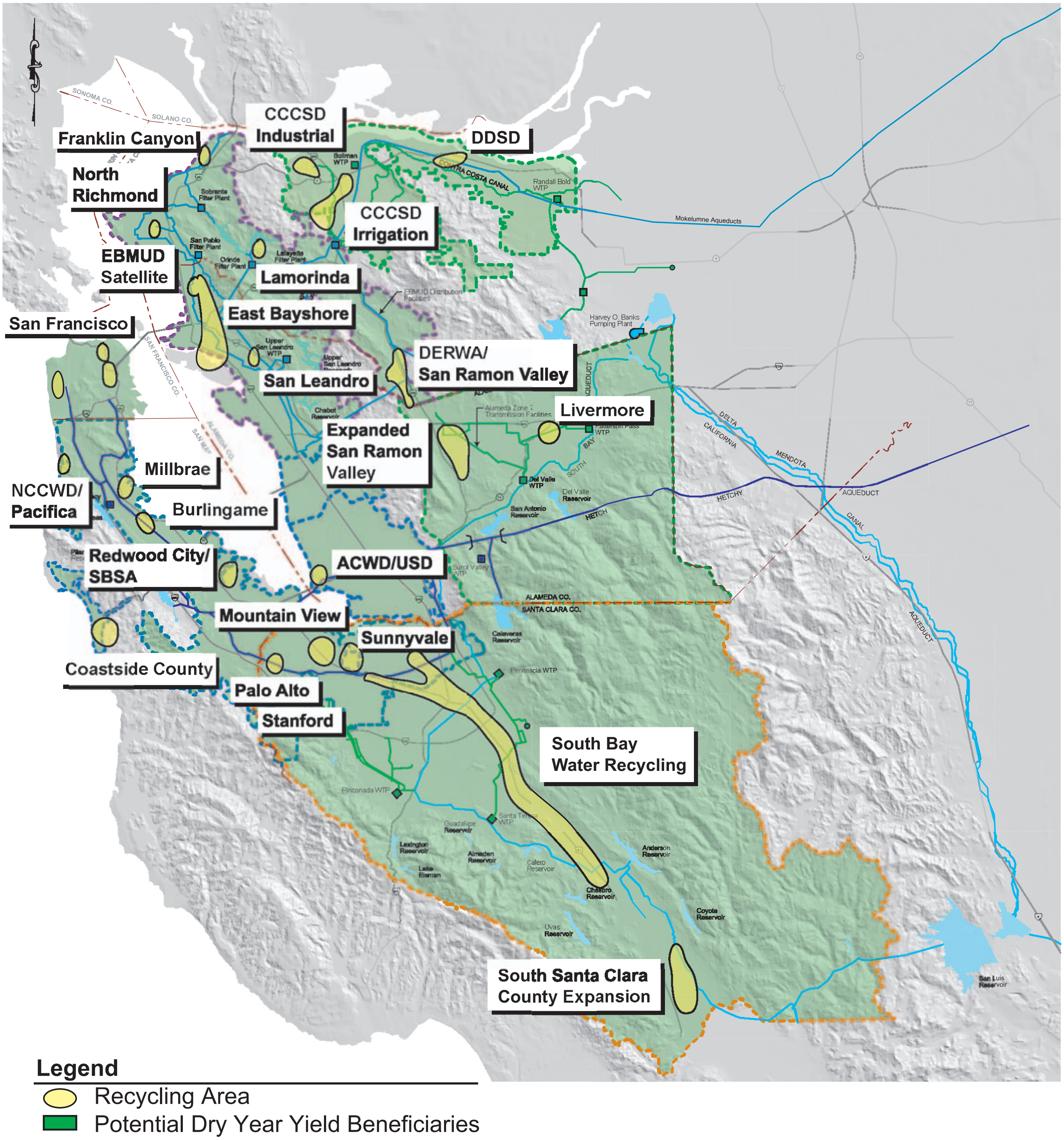

Figure G4-1

Locations of Potential Water Recycling Concepts

CDM

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Concept: Recycled Water Concepts

Table G4-1 - Supply Reliability Score Card

Performance Measure/Objective	Agency Baseline Amount or Description	Units	Recycled Water Concepts Amount or Description	Units	Agency Baseline Plus Recycled Water Concepts[1] Amount or Description	Units	Notes/Other
Meet Demands	Compares supply from concept with baseline supply						
Critical Drought							
ACWD Supply (SWP)	20,600	AFY	Up to 1,650	AFY	20,600	AFY	Specific amounts for each agency to be determined. Estimates report total supply available from all projects that agency is partnered in.
BAWSCA Agencies' Supply	137,800	AFY	Up to 35,836	AFY	137,800	AFY	
CCWD Supply	176,800	AFY	Up to 22,520	AFY	176,800	AFY	
EBMUD Supply	200,430	AFY	Up to 15,366	AFY	200,430	AFY	
SCVWD Supply	39,400	AFY	Up to 19,694	AFY	39,400	AFY	
SFPUC Supply	157,000	AFY	Up to 54,256	AFY	157,000	AFY	
Zone 7 Supply	38,900	AFY	Up to 6,890	AFY	38,900	AFY	
Total Supply[2]	633,130	AFY	Up to 96,982	AFY	633,130	AFY	
Extended Drought							
ACWD Supply (SWP)	25,500	AFY	Up to 1,650	AFY	25,500	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 35,836	AFY	209,900	AFY	
CCWD Supply	170,800	AFY	Up to 22,520	AFY	170,800	AFY	
EBMUD Supply	216,420	AFY	Up to 15,366	AFY	216,420	AFY	
SCVWD Supply	63,000	AFY	Up to 19,694	AFY	63,000	AFY	
SFPUC Supply	255,000	AFY	Up to 54,256	AFY	255,000	AFY	
Zone 7 Supply	56,400	AFY	Up to 6,890	AFY	56,400	AFY	
Total Supply[2]	787,120	AFY	Up to 96,982	AFY	787,120	AFY	
Average Year							
ACWD Supply (SWP)	42,700	AFY	Up to 1,650	AFY	42,700	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 35,836	AFY	345,000	AFY	
CCWD Supply	139,400	AFY	Up to 22,520	AFY	139,400	AFY	
EBMUD Supply	255,590	AFY	Up to 15,366	AFY	255,590	AFY	
SCVWD Supply	97,800	AFY	Up to 19,694	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	Up to 54,256	AFY	329,000	AFY	
Zone 7 Supply	71,400	AFY	Up to 6,890	AFY	71,400	AFY	
Total Supply[2]	935,890	AFY	Up to 96,982	AFY	935,890	AFY	
Vulnerability							
ACWD	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems potential participating agencies.				
BAWSCA Agencies	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.						
CCWD	Delta supply sources susceptible to liquefaction of Delta levees.						
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.						
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.						
SFPUC	Transmission system vulnerable to seismic events on the Hayward or Calaveras faults. Watershed-related turbidity events can cause short-duration curtailment of unfiltered Hetch Hetchy supply.						
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.						
Self-Sufficiency within the Region							
Increases Self-Sufficiency within Region. Concepts will be owned, operated, and controlled locally.							

1. Some agencies include recycled water supplies in future supply projections. As a result, recycled water has not been considered as an additional supply, and does not result in an increased total supply as compared to

2. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Concept: Recycled Water Concepts

Table G4-2 - Public Health Protection Scorecard

Concept: Water Recycling

Performance Measure/Objective	Concept		Baseline Plus Concept		Notes
	Recycled Water Concepts Source Water	**Recycled Water Concepts Treated Water**	**Recycled Water Concepts Source Water**	**Recycled Water Concepts Treated Water**	
Variability for Treatment					
ACWD	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
BAWSCA Agencies	N/A	N/A			
CCWD	N/A	N/A			
EBMUD	N/A	N/A			
SCVWD	N/A	N/A			
SFPUC	N/A	N/A			
Zone 7	N/A	N/A			
Total Dissolved Solids					
ACWD	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
BAWSCA Agencies	N/A	N/A			
CCWD	N/A	N/A			
EBMUD	N/A	N/A			
SCVWD	N/A	N/A			
SFPUC	N/A	N/A			
Zone 7	N/A	N/A			
Disinfection By-Products					
ACWD	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
BAWSCA Agencies	N/A	N/A			
CCWD	N/A	N/A			
EBMUD	N/A	N/A			
SCVWD	N/A	N/A			
SFPUC	N/A	N/A			
Zone 7	N/A	N/A			
Taste and Odor Problems (Excluding TDS)					
ACWD	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
BAWSCA Agencies	N/A	N/A			
CCWD	N/A	N/A			
EBMUD	N/A	N/A			
SCVWD	N/A	N/A			
SFPUC	N/A	N/A			
Zone 7	N/A	N/A			
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
BAWSCA Agencies	N/A	N/A			
CCWD	N/A	N/A			
EBMUD	N/A	N/A			
SCVWD	N/A	N/A			
SFPUC	N/A	N/A			
Zone 7	N/A	N/A			
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	No Effect on Potential for Degradation	N/A			
BAWSCA Agencies	Increases Potential for Degradation	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with advanced treatment, emerging contaminants including NDMA and pharmaceuticals may be introduced into the groundwater basin due to usage of recycled water.		
CCWD	N/A	N/A			
EBMUD	Increases Potential for Degradation	N/A			
SCVWD	Increases Potential for Degradation	N/A			
SFPUC	Increases Potential for Degradation	N/A			
Zone 7	Increases Potential for Degradation	N/A			

Concept: Recycled Water Concepts

Table G4-3 - Cost, Environmental and Implementation Score Card

	Concept	
Performance Measure/Objective	**Amount or Rating**	**Notes/Other**
Cost Impacts		
Total Cost		
Capital Cost	$839 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
Operating & Maintenance Cost	$22 M	
Environmental Mitigation Cost	Included in Capital Cost	
Lifecycle Cost	$83 M	
Allocation of Costs	$1,480/AF	
Environmental Impacts[1]		
Overall Impacts to Environment[1]	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
Overall Benefits to Environment[1]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** The potential benefits associated with the proposed concepts include offsetting the development of higher capacity water supply projects. This translates to a potential reduction in environmental impacts associated with the construction and operation of larger water-related facilities. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential		
External Support	TBD[2] - Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.	
Ability to Get Outside Funding	TBD[2] - The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds.	
Internal Consistency with Agency Plans and Baselines	TBD[2] - All of the recycled water projects have been studied by their respective agency (ies) and are being planned in conjunction with other agency water supply and water quality efforts.	
Regional Perspective		
Number of Agencies Receiving Benefits	7	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	6,000,000 people	

1. This section provides a general environmental rating. For detailed rating on several environmental topics see Table 4.

2. To be determined in future studies.

Concept: Recycled Water Concepts

Table G4-4 - Environmental Score Card

Performance Measure/Objective	Concept Rating	Notes/Other
Aquatic Environment		
Potential Impacts to Aquatic Environment		**Effects on Aquatic Environment (Before Mitigation): Impacts.** Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)		**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for each concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult wit regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.
Wetlands		
Potential Impacts to Wetland Resources (acreage affected)		**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)		**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g. for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
Energy Consumption		
Potential Increases in Energy Consumption (amount of energy required for facility operation)		**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production		

G5 Regional Desalination Project

G5 Regional Desalination Project

DESCRIPTION

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for the residents and businesses served by partner agencies by developing a desalination plant, or plants, at a site, or sites, that will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring this study are CCWD, EBMUD, SFPUC and SCVWD.

The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all-weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 MGD product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water.

Regional Desalination Project Concept Summary

Extended Dry Year Supply ....Up to 135,000 AFY

Average Year Water
Quality Supply..TBD in future studies

Cost ($2005)
Capital Cost...TBD in future studies
O&M Cost...TBD in future studies
Unit Cost ....TBD in future studies

Potential Owning Agency
CCWD, EBMUD, SFPUC, SCVWD

Potential Partners
CCWD, EBMUD, SFPUC(1), SCVWD

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

In Phase I, the Regional Desalination Study explored thirteen potential desalination locations, and evaluated the sites based on seven criteria: feedwater quality, cost of product water, permitting/water rights requirements, public acceptance/socioeconomic effects, potential for grant funding, capability of supplying multiple agencies, and environmental effects. Three potential desalination sites were identified for further evaluation in subsequent phases of the Study: Mirant Pittsburg Plant (co-located with the Mirant Pittsburg Power Plant in Pittsburg, California); Oceanside, San Francisco (located on the western shore of the Peninsula within San Francisco, possibly adjacent to the existing Oceanside wastewater treatment plant); and Near Bay Bridge (located in close proximity to EBMUD's wastewater treatment plant in Oakland, on the eastern side of the Bay Bridge). Phase I evaluated these three sites and developed projected cost estimates assuming year-round operation in all year types. Details of operation, as well as benefits and/or impacts to the RDP partners, will be developed in future phases of the project[1].

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[1] Average year water quality supply, projected costs, and both supply and water quality benefits and/or impacts to each RDP partner will be developed in subsequent phases of the Regional Desalination Project, and will not be incorporated into the current BAWQ&SRP.

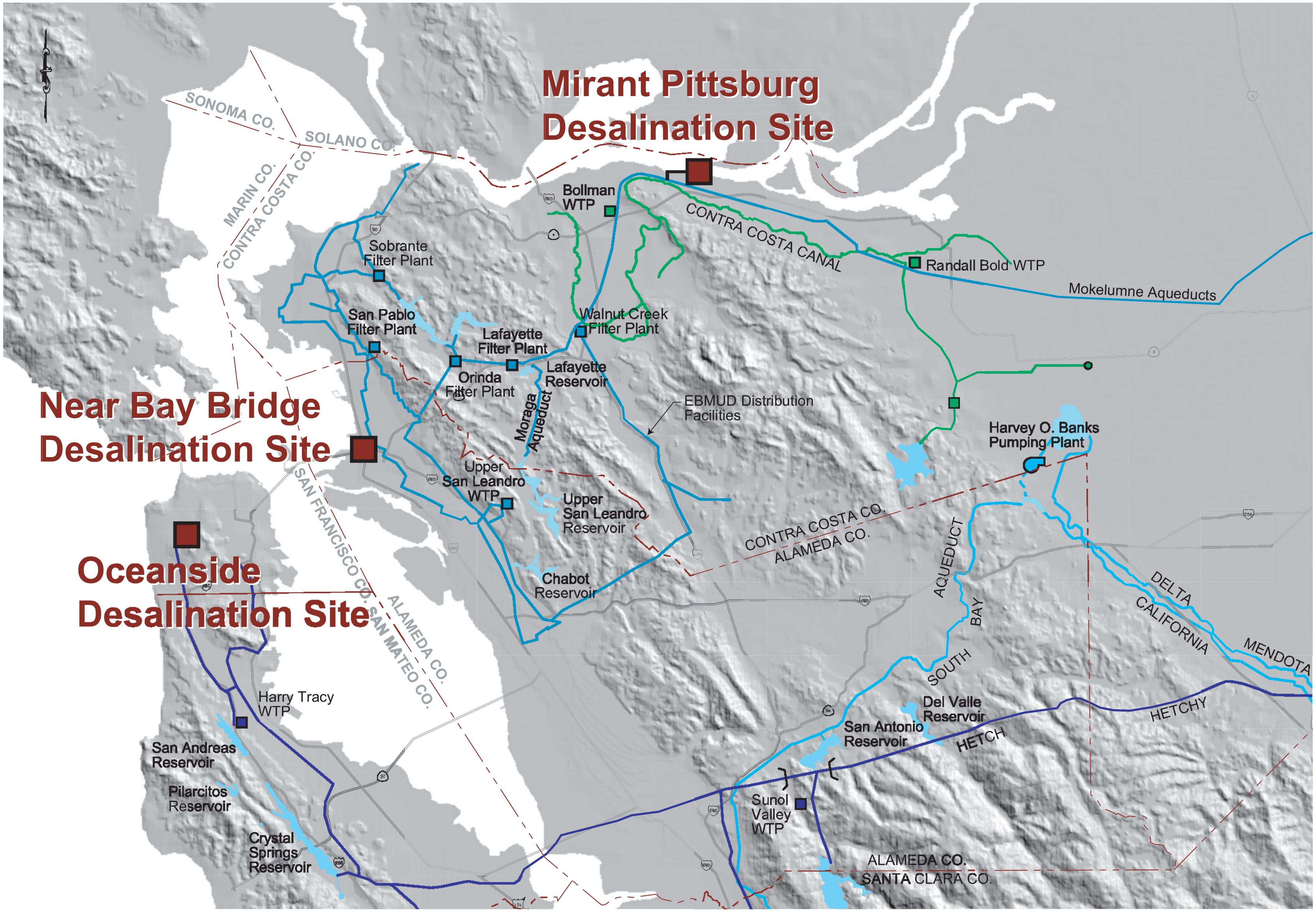

Figure G5-1

Regional Desalination Project Potential Sites

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Table G5-1 - Supply Reliability Score Card

Performance Measure/Objective	Agency Baseline Amount or Description	Agency Baseline Units	Regional Desalination Concept Amount or Description	Regional Desalination Concept Units	Agency Baseline Plus Regional Desalination Concept Amount or Description	Agency Baseline Plus Regional Desalination Concept Units	Notes/Other
Meet Demands		Compares supply from concept with baseline supply					
Critical Drought							Specific plant locations and amounts for each agency to be determined as part of Regional Desalination Project.
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply[2]	137,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
CCWD Supply	176,800	AFY	TBD[1]	AFY	TBD[1]	AFY	
EBMUD Supply	200,430	AFY	TBD[1]	AFY	TBD[1]	AFY	
SCVWD Supply	39,400	AFY	TBD[1]	AFY	TBD[1]	AFY	
SFPUC Supply	157,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[3]	711,430	AFY	TBD[1]	AFY	TBD[1]	AFY	
Extended Drought							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply[2]	209,900	AFY	TBD[2]	AFY	TBD[2]	AFY	
CCWD Supply	170,800	AFY	TBD[1]	AFY	TBD[1]	AFY	
EBMUD Supply	216,420	AFY	TBD[1]	AFY	TBD[1]	AFY	
SCVWD Supply	63,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
SFPUC Supply	255,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[3]	915,120	AFY	TBD[1]	AFY	TBD[1]	AFY	
Average Year							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply[2]	345,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
CCWD Supply	139,400	AFY	TBD[1]	AFY	TBD[1]	AFY	
EBMUD Supply	255,590	AFY	TBD[1]	AFY	TBD[1]	AFY	
SCVWD Supply	97,800	AFY	TBD[1]	AFY	TBD[1]	AFY	
SFPUC Supply	329,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[3]	1,166,790	AFY	TBD[1]	AFY	TBD[1]	AFY	
Vulnerability							
ACWD	N/A		N/A				
BAWSCA Agencies[2]	N/A		N/A				
CCWD	Delta supply sources susceptible to liquefaction of Delta levees.		TBD[1] - Ability of project to reduce agency vulnerability will depend on specific location and sizing of facilities.				
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.						
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.						
SFPUC	Transmission system vulnerable to seismic events on the Hayward or Calaveras faults. Watershed-related turbidity events can cause short-duration curtailment of unfiltered Hetch Hetchy supply.						
Zone 7	N/A		N/A				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled.							

1. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

2. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.

3. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Table G5-2 - Public Health Protection Scorecard

Concept: Regional Desalination Project

Performance Measure/Objective	Concept		Baseline Plus Concept		Notes
	Regional Desalination Project Source Water	**Regional Desalination Project Treated Water**	**Regional Desalination Project Source Water**	**Regional Desalination Project Treated Water**	
Variability for Treatment					
ACWD					
BAWSCA Agencies[2]					
CCWD	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
EBMUD					
SCVWD					
SFPUC					
Zone 7					
Total Dissolved Solids					
ACWD					
BAWSCA Agencies[2]					
CCWD	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
EBMUD					
SCVWD					
SFPUC					
Zone 7					
Disinfection By-Products					
ACWD					
BAWSCA Agencies[2]					
CCWD	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
EBMUD					
SCVWD					
SFPUC					
Zone 7					
Taste and Odor Problems (Excluding TDS)					
ACWD					
BAWSCA Agencies[2]					
CCWD	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
EBMUD					
SCVWD					
SFPUC					
Zone 7					
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD					
BAWSCA Agencies[2]					
CCWD	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
EBMUD					
SCVWD					
SFPUC					
Zone 7					
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD					
BAWSCA Agencies[2]					
CCWD	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
EBMUD					
SCVWD					
SFPUC					
Zone 7					

1. Location of facilities and specific benefits to agencies will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.
2. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.

Table G5-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	Concept Amount or Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Specific capital costs, operating costs and lifecycle costs will depend on location and operation of facilities. The Regional Desalination Project Phase 1 report included capital costs ($2003) ranging from $168M to $285M for a 40-MGD plant at each of the
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	
Environmental Impacts[2]		
Overall Impacts to Environment[2]	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
Overall Benefits to Environment[2]	TBD[1]	
Implementation Potential		
External Support	TBD[1]	Scoring of implementation issues will depend on specific locations and operation of facilities.
Ability to Get Outside Funding	TBD[1]	
Internal Consistency with Agency Plans and Baselines	TBD[1]	
Regional Perspective		
Number of Agencies Receiving Benefits	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
Population Receiving Benefits	TBD[1]	

1. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Concept: Regional Desalination Project

Table G5-4 - Environmental Score Card

Performance Measure/Objective	Concept Rating	Notes/Other
Aquatic Environment		
Potential Impacts to Aquatic Environment	TBD[1]	Will depend on specific sites, sizes and operations.
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)	TBD[1]	Will depend on specific sites, sizes and operations.
Wetlands		
Potential Impacts to Wetland Resources (acreage affected, mitigation)	TBD[1]	Will depend on specific sites, sizes and operations.
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)	TBD[1]	Will depend on specific sites, sizes and operations.
Energy Consumption		
Potential Increase in Energy Consumption (amount of energy required for operation)	TBD[1]	Will depend on specific sites, sizes and operations.
Potential Increase in Criteria Pollutant (Nox, Sox, ROG and CO) Production	TBD[1]	

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

G6 Mirant Desalination with Water Quality Element

G6 Mirant Desalination with Water Quality Element

DESCRIPTION

The Mirant Desalination with Water Quality Element concept would involve co-location of an up to 40 MGD desalination plant at either the Mirant Pittsburg Power Plant in Pittsburg, or the Mirant Contra Costa Power Plant in Antioch. This concept is a variation on the project described in the Bay Area Regional Desalination Project Pre-Feasibility Study (RDP PFR, 2003). It has not been evaluated by the Regional Desalination Project. In contrast to the regional study, which evaluated this concept principally for dry-year supply for the four regional partners (CCWD, EBMUD, SFPUC, and SCVWD), this study is evaluating the potential to also provide average year water quality benefits to interested agencies, including those who are not currently partners in the RDP. Additional analysis will be required to address potential environmental, water rights, institutional, cost-sharing and other issues if this concept appears feasible.

The Bay Area agency potentially interested in this concept is the Zone 7 Water Agency. Supply from the Mirant Desalination with Water Quality Element concept would potentially be conveyed through the EBMUD Mokelumne Aqueduct, treated and conveyed through the distribution system for delivery to Zone 7, via a new intertie connecting EBMUD's San Ramon Valley system with Zone 7 transmission facilities. This water could be used directly by the Zone 7 retail customers, or injected into the groundwater basin. This concept assumes that water delivered to Zone 7 would be either State Water Project (SWP) water or Mirant Pittsburg or Antioch Desalinated water purchased by Zone 7. Use of either SWP water or other supplies may require modification of existing water rights or acquisition of new water rights by Zone 7. This study assumed an intertie size of up to 25 MGD, with a potential annual transfer of up to 15,000 acre-feet during winter months in average or wet hydrologic years, based on estimates of available capacity in the EBMUD system. Additional study would be required to determine whether capacity is continuously available in the EBMUD system.

Mirant Desalination with Water Quality Element Concept Summary

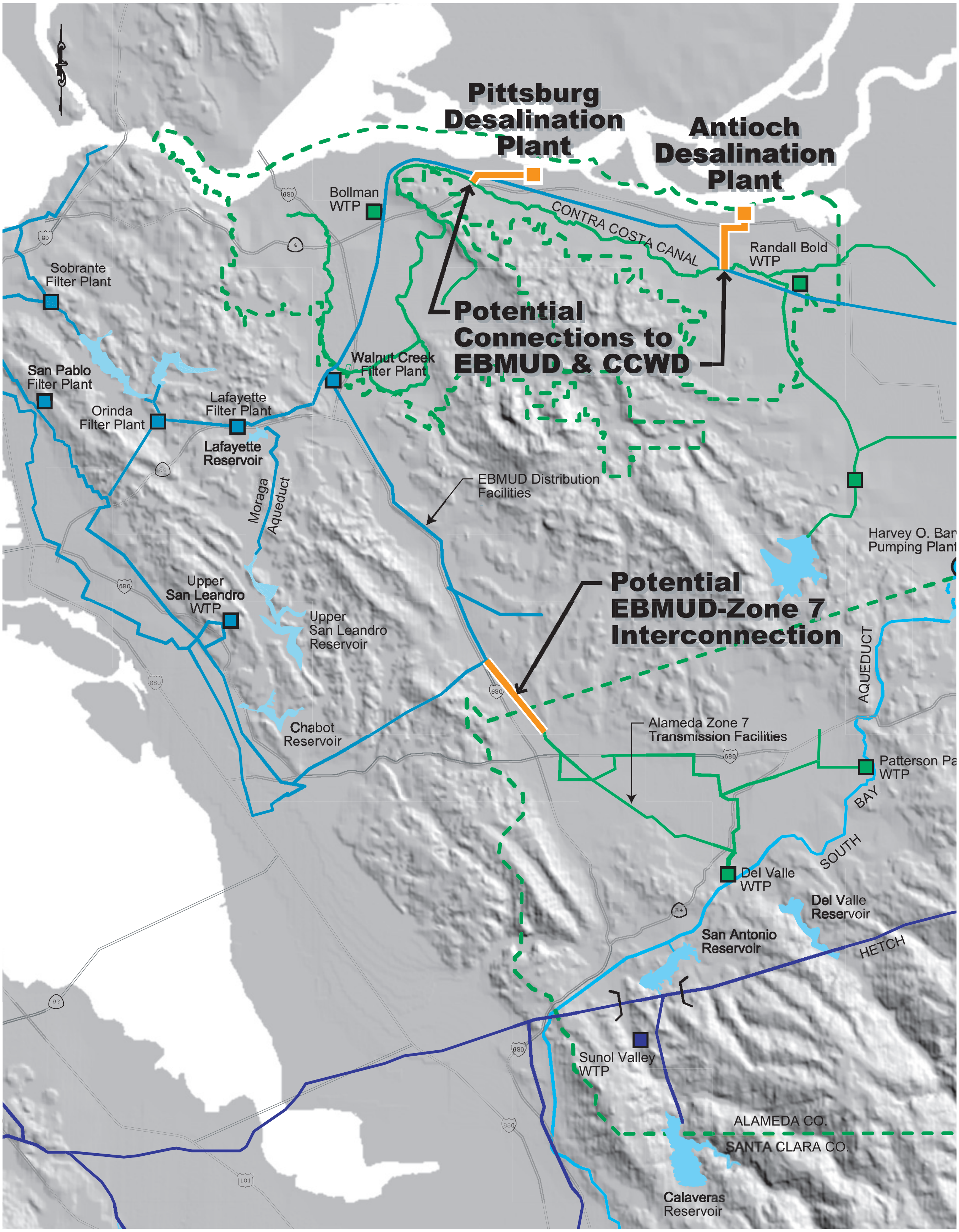
Extended Dry Year Supply .... TBD[1]

Average Year Water Quality Supply .... up to 15,000 AFY

Cost ($2005)
Capital Cost .... TBD in future studies
O&M Cost .... TBD in future studies
Unit Cost .... TBD in future studies

Potential Owning Agency
EBMUD, CCWD

Potential Partners
Zone 7 Water Agency



Legend

🟧 Potential Pipeline Alignment

Figure G6-1

Mirant Antioch or Pittsburg Desalination Regional View

Concept: Mirant Desalination with Water Quality Element

Table G6-1 - Supply Reliability Score Card[1]

Performance Measure/Objective	Agency Baseline Amount or Description	Agency Baseline Units	Mirant Desalination with Water Quality Element Concept Amount or Description	Mirant Desalination with Water Quality Element Concept Units	Agency Baseline Plus Mirant Desalination with Water Quality Amount or Description	Agency Baseline Plus Mirant Desalination with Water Quality Units	Notes/Other
Meet Demands	Compares supply from concept with baseline supply						
Critical Drought							EBMUD could receive dry-year supply via the Mokelumne Aqueduct. CCWD could receive water via the Multi-purpose Pipeline. Specific plant locations, allocations or exchange between EBMUD and CCWD or with other partner agencies will be determined as part of the Regional Desalination Project. This concept, which is a variation on the RDP (and is not being evaluated in the RDP), evaluates only the Mirant site and includes potential average water quality deliveries to Zone 7, who is not a partner agency. Zone 7 would not be a recipient of dry-year supply.
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	0	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	0	AFY	
CCWD Supply[2,3]	*176,800*	*AFY*	*Up to 43,000*	*AFY*	*Up to 176,800*	*AFY*	
EBMUD Supply[2,3]	*200,430*	*AFY*	*Up to 43,000*	*AFY*	*Up to 243,430*	*AFY*	
SCVWD Supply[3]	*39,400*	*AFY*	*TBD*[3]	*AFY*	*TBD*[3]	*AFY*	
SFPUC Supply[3]	*157,000*	*AFY*	*TBD*[3]	*AFY*	*TBD*[3]	*AFY*	
Zone 7 Supply	38,900	AFY	0	AFY	38,900	AFY	
Total Supply[5]	*612,530*	*AFY*	*Up to 43,000*	*AFY*	*Up to 655,530*	*AFY*	
Extended Drought							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply[2,3]	*170,800*	*AFY*	*Up to 43,000*	*AFY*	*Up to 176,800*	*AFY*	
EBMUD Supply[2,3]	*216,420*	*AFY*	*Up to 43,000*	*AFY*	*Up to 255,590*	*AFY*	
SCVWD Supply[3]	*63,000*	*AFY*	*TBD*[3]	*AFY*	*TBD*[3]	*AFY*	
SFPUC Supply[3]	*255,000*	*AFY*	*TBD*[3]	*AFY*	*TBD*[3]	*AFY*	
Zone 7 Supply	56,400	AFY	0	AFY	56,400	AFY	
Total Supply[5]	*761,620*	*AFY*	*Up to 43,000*	*AFY*	*Up to 804,620*	*AFY*	
Average Year							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	255,590	AFY	0	AFY	255,590	AFY	
SCVWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SFPUC Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Zone 7 Supply[4]	71,400	AFY	Up to 15,000	AFY	71,400	AFY	
Total Supply	326,990	AFY	Up to 15,000	AFY	326,990	AFY	
Vulnerability							
ACWD	N/A		N/A				
BAWSCA Agencies	N/A		N/A				
CCWD	*Delta supply sources susceptible to liquefaction of Delta levees.*		*Reduces Vulnerability - This concept would provide additional reliability to CCWD by providing an additional supply downstream of Delta sources. As a treated water supply it could also replace a portion of the capacity of the Randall Bold Water Treatment Plant, if it were out of service.*				
EBMUD	*Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.*		*No Effect on Vulnerability - This concept would provide additional reliability in the case of full or partial loss of the Mokelumne supply or Mokelumne Aqueducts. It would not provide against loss due to a seismic event either on the Hayward or Calaveras faults.*				
SCVWD	*Delta supply sources susceptible to liquefaction of Delta levees.*		*TBD*[3]				
SFPUC	*Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.*		*TBD*[3]				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Provides separate connection point to Zone 7 if South Bay Aqueduct were interrupted. Availability limited to winter months of average years, during non-emergency conditions in EBMUD system.				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would control the water quality element of the concept locally.							

1. This concept consists of average and wet year water quality deliveries to Zone 7, and is dependent upon the base desalination facility, which is part of the Regional Desalination Project. Shaded cells reflect potential benefits associated with the base desalination facility, to be determined by the Regional Desalination Project. Unshaded cells reflect incremental benefits associated with the concept (water quality element).

2. Supply partitioning between CCWD and EBMUD has not been determined as part of this study. EBMUD and CCWD would take up to 43,000 MGD of dry year supply as necessary to meet demand, and would not take supply in excess of demand. For critical and extended dry years, but not in average years, it is assumed that demand will exceed supply. As a result, the potential desalinated supply has been added to baseline for critical and extended dry years, but not in average years.

3. All RDP partners will benefit from the desalination facility in dry years. The quantity and operations will be determined in future phases of the RDP process.

4. Zone 7 would use up to 15,000 AFY of supply in average years to offset existing, lower quality supplies.

5. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Concept: Mirant Desalination with Water Quality Element

Table G6-2 - Public Health Protection Scorecard[1]

Concept: Mirant Desalination with Water Quality Element

	Concept[2]		Baseline Plus Concept[3]		
Performance Measure/Objective	**Mirant Desalination with Water Quality Element Source Water**	**Mirant Desalination with Water Quality Element Treated Water**	**Mirant Desalination with Water Quality Element Source Water**	**Mirant Desalination with Water Quality Element Treated Water**	**Notes**
Variability for Treatment					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	No Effect on Variability	NA	Bromide slightly more variable, TOC and TDS same to less variable. No projected treatment implications.
SCVWD					
SFPUC					
Zone 7	NA	NA	NA	NA	Zone 7 receives treated supplies.
Total Dissolved Solids					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	No Effect on TDS	No Effect on TDS	
SCVWD					
SFPUC					
Zone 7	NA	Reduces TDS	NA	NA	
Disinfection By-Products					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	NA	No Effect on DBPs	Bromate and THM4 increased slightly, HAA5 slightly reduced.
SCVWD					
SFPUC					
Zone 7	NA	Reduces DBPs	NA	NA	All DBPs except bromate reduced for Zone 7 customers receiving blended Mokelumne/Mirant water. Bromate present only in very low concentrations, at or near the detection limit.
Taste and Odor Problems (Excluding TDS)					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	NA	Degrades T&O	Reduced overall quality. Bromide increased to concentrations experienced in dry years.
SCVWD					
SFPUC					
Zone 7	NA	Improves T&O	NA	NA	Improved overall quality for customers receiving Mokelumne/Mirant water
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD					Mirant water quality is slightly degraded as compared with EBMUD baseline, but represents an improvement over the Zone 7 baseline.
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	Increases Potential for Degradation	NA	
SCVWD					
SFPUC					
Zone 7	NA	Reduces Potential for Degradation	NA	NA	
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD					Emerging contaminants are not expected to be a factor with desalinated brackish supplies.
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	No Effect on Potential for Degradation	NA	
SCVWD					
SFPUC					
Zone 7	NA	No Effect on Potential for Degradation	NA	NA	

1. Scores reflect water quality effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. Values in these columns represent the quality of the Mokelumne-Mirant blend received by Zone 7, after treatment by EBMUD, and do not reflect the effects of blending with Zone supplies. For the purposes of this study, Mirant Desalination permeate TDS was approximated as average Freeport TDS (101 mg/L). Actual permeate water quality will be

3. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively). For the purposes of this study, Mirant Desalination permeate TDS was approximated as average Freeport TDS. Actual permeate water quality will be determined by the RDP.

Table G6-2a - Public Health Protection Score Card by Agency[1]

Agency: EBMUD

			Agency Baseline[2]		Concept		Baseline Plus Concept[3]		
Performance Measure/Objective	**Metric or Qual**	**Units**	**EBMUD Source Water**	**EBMUD Treated Water[4]**	**Mirant Desalination with Water Quality Element Source Water**	**Mirant Desalination with Water Quality Element Treated Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Source Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Treated Water[4]**	**Notes**
Supply Quantity									
Critical Year		AFY	200,430		0		243,430		
Extended Dry Year		AFY	216,420		0		255,590		
Average Year		AFY	255,590		0		255,590		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.05	0.01 - 0.04	NA	NA	NA	NA	
	Mean	mg/L	0.03	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.8 - 3.3	1.1 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	2.7	1.9	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	ND - 0.05	0.00 - 0.05	NA	NA	NA	NA	
	Mean	mg/L	0.02	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.0 - 3.3	0.5 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	1.8	1.1	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.01	0.01 - 0.01	NA	NA	0.01 - 0.01	0.01 - 0.01	
	Mean	mg/L	0.01	0.01	NA	NA	0.01	0.01	
TOC	Range	mg/L	0.6 - 1.3	0.1 - 0.7	NA	NA	0.6 - 1.3	0.1 - 0.7	
	Mean	mg/L	1.0	0.4	NA	NA	0.9	0.4	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	variable	variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	36 - 113	56 - 133	NA	NA	NA	NA	
	Mean	mg/L	80	100	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	28 - 108	48 - 128	NA	NA	NA	NA	
	Mean	mg/L	55	75	NA	NA	NA	NA	
Average Year	Range	mg/L	31 - 37	51 - 57	NA	NA	32 - 39	51 - 59	
	Mean	mg/L	35	54	NA	NA	36	55	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	1	NA	NA	NA	NA	
THM4	Range	ug/L	NA	10 - 16	NA	NA	NA	NA	
	Mean	ug/L	NA	14	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	8 - 12	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	2 - 14	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	5 - 13	NA	NA	NA	NA	
	Mean	ug/L	NA	9	NA	NA	NA	NA	
Average Year									
Bromate	Range	ug/L	NA	ND	NA	NA	NA	ND	
	Mean	ug/L	NA	ND	NA	NA	NA	ND	
THM4	Range	ug/L	NA	3 - 7	NA	NA	NA	3 - 7	
	Mean	ug/L	NA	5	NA	NA	NA	5	
HAA5	Range	ug/L	NA	4 - 8	NA	NA	NA	4 - 8	
	Mean	ug/L	NA	6	NA	NA	NA	6	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	diminished	Lower quality source (higher bromide)
Algal blooms	Qual		minimal	NA	NA	NA	improved	NA	TOC is decreased, temperature is not greatly affected

1. Scores reflect water quality effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.
2. Baseline water quality data was collected from EBMUD and is detailed in the EBMUD section of the Water Supply and Water Quality Baseline Technical Memorandum.
3. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively) . For the purposes of this study, Mirant Desalination permeate TDS was approximated as average Freeport TDS. Actual permeate water quality will be determined by the RDP.
4. For the purposes of this analysis, settled water ozonation was assumed.

Concept: Mirant Desalination with Water Quality Element

Table G6-2b - Public Health Protection Score Card by Agency[1]

Agency: Zone 7

			Agency Baseline[2]			Concept[3]		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Mirant Desalination with Water Quality Element Source Water**[4]	**Mirant Desalination with Water Quality Element Treated Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Source Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Treated Water**	**Notes**
Supply Quantity										
Critical Year		AFY	38,900			0		38,900		
Extended Dry Year		AFY	56,400			0		56,400		
Average Year		AFY	71,400			15,000		71,400		
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	0.01 - 0.01	0.01 - 0.01	NA	NA	
	Mean	mg/L	0.19	0.15	0.15	0.01	0.01	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	0.6 - 1.3	0.1 - 0.7	NA	NA	
	Mean	mg/L	4.0	3.7	3.7	0.9	0.4	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	NA	NA	SBA pH is widely variable, but is buffered during treatment. Mirant/Mokelumne blend pH is less variable.
Temperature	Qual		variable	less variable	less variable	variable	variable	NA	NA	SBA temperature is variable.
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	NA	NA	
	Mean	mg/L	507	517	517	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	NA	NA	
	Mean	mg/L	384	394	394	NA	NA	NA	NA	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	32 - 39	51 - 59	NA	NA	
	Mean	mg/L	296	306	306	36	55	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	NA	
	Mean	ug/L	NA	86	89	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	NA	
	Mean	ug/L	NA	44	46	NA	NA	NA	NA	
Extended Dry Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	NA	
	Mean	ug/L	NA	67	67	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	NA	
	Mean	ug/L	NA	39	39	NA	NA	NA	NA	
Average Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	ND	NA	NA	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	3 - 7	NA	NA	
	Mean	ug/L	NA	68	69	NA	6	NA	NA	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	4 - 8	NA	NA	
	Mean	ug/L	NA	43	43	NA	7	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	improved	NA	NA	Higher quality source (lower TDS, TOC, bromide) for customers receiving Mirant/Mokelumne blend
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	Zone 7 does not receive source water from this concept.

1. Scores reflect water quality effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. Baseline water quality data is detailed in the Zone 7 section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Mokelumne-Mirant blend only, before and after treatment by EBMUD (source and treated, respectively), and do not reflect the effects of blending with Zone 7 supplies. For the purposes of this study, Mirant Desalination permeate TDS was approximated as average Freeport TDS. Actual permeate water quality will be determined by the RDP.

4. Values in this column represent the quality of the Mokelumne-Mirant blend prior to treatment by EBMUD. Note that Zone 7 does not receive untreated water from this concept (Zone 7 receives this water following treatment by EBMUD). Values are presented for reference with respect to CALFED ROD source water improvement targets.

Concept: Mirant Desalination with Water Quality Element

Table G6-3 - Cost, Environmental and Implementation Score Card[1]

Performance Measure/Objective	Concept Amount or Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	TBD[2]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
Operating & Maintenance Cost	TBD[2]	
Environmental Mitigation Cost	TBD[2]	
Lifecycle Cost	TBD[2]	
Allocation of Costs	TBD[2]	Allocation of costs will not be performed as part of this study.
Environmental Impacts[3]		
Overall Impacts to Environment[3]	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
Overall Benefits to Environment[3]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential		
External Support	TBD[2] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[2] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
Consistency with Local and Regional Plans	TBD[2] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
Population Receiving Benefits	280,000 people	

1. Scores reflect incremental effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. To be determined in future studies.

3. This section provides a general environmental rating. For detailed rating on several environmental topics see Table 4.

Concept: Mirant Desalination with Water Quality Element

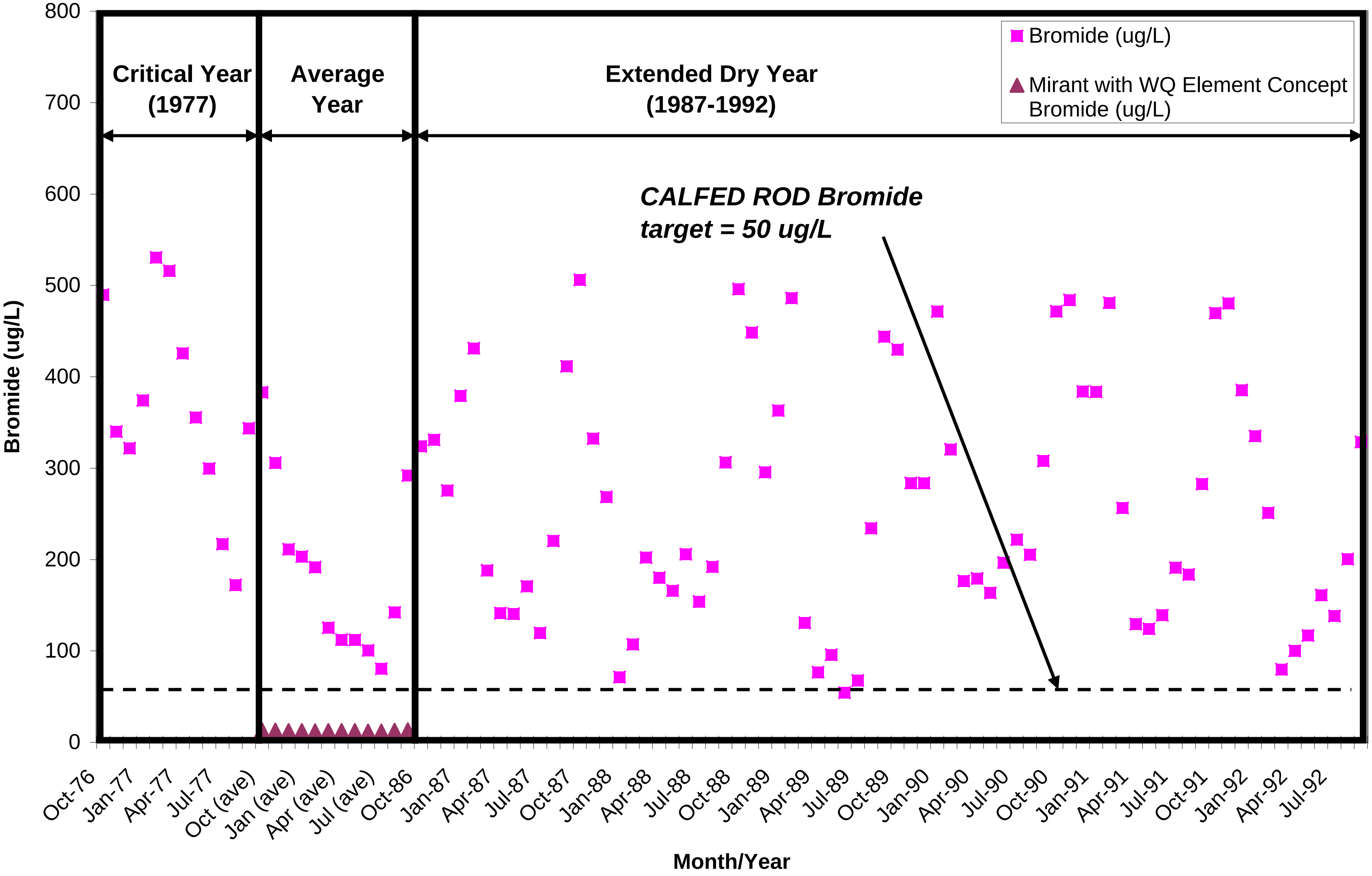
Table G6-4 - Environmental Score Card[1]

Performance Measure/Objective	Concept Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 15,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but not be limited to, restriction on the construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD^2.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD^2.** Further evaluation would be required to determine the level of impact and mitigation opportunities.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

1. Scores reflect incremental effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.
2. To be determined in future studies.

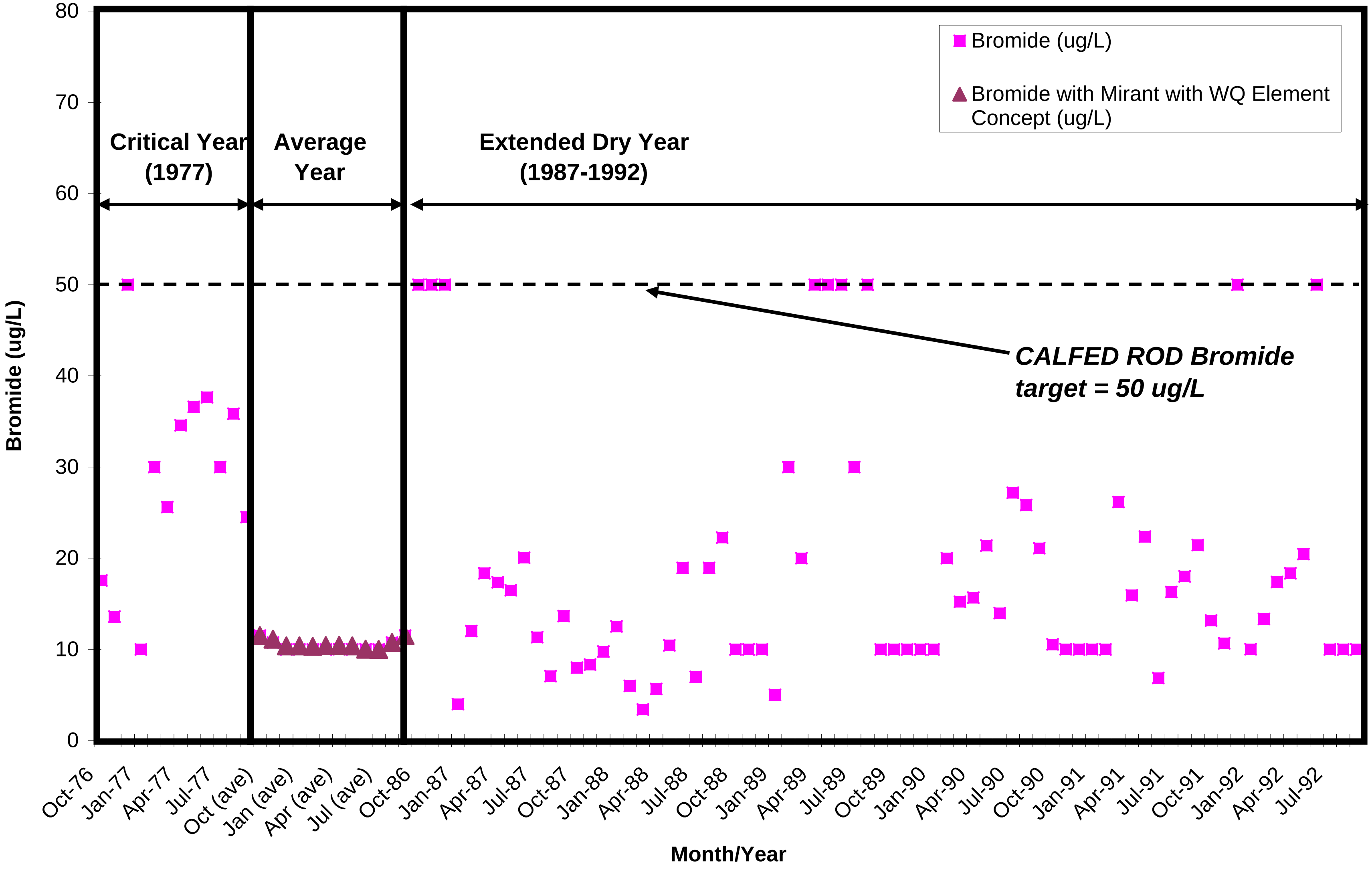
Concept: Mirant Desalination with Water Quality Element

Comparison of Zone 7 Baseline Source Water Bromide with Mirant Desalination with Water Quality Element Concept Bromide



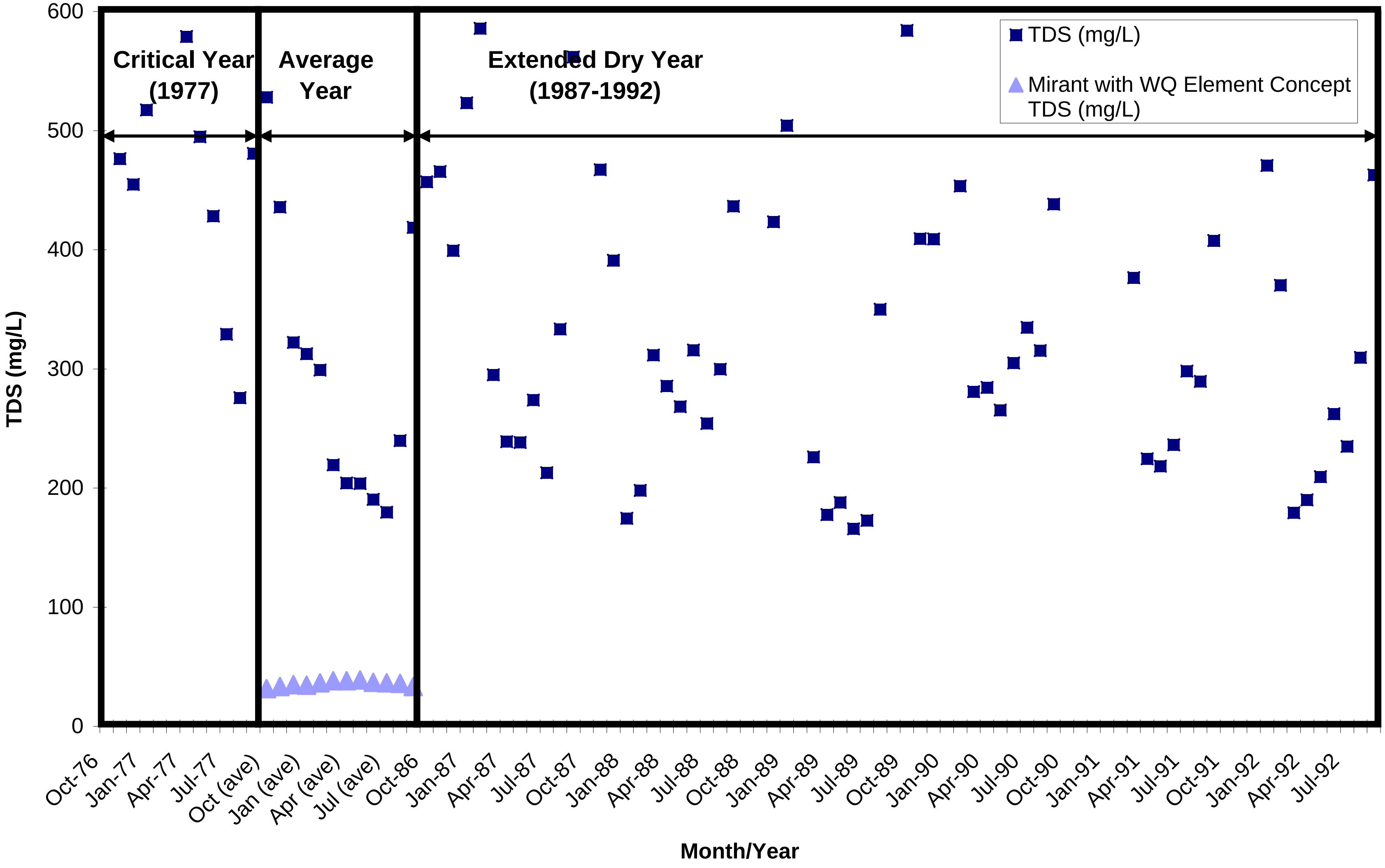
Concept: Mirant Desalination with Water Quality Element

Comparison of EBMUD Baseline Source Water Bromide with Mirant Desalination with Water Quality Element Concept Bromide



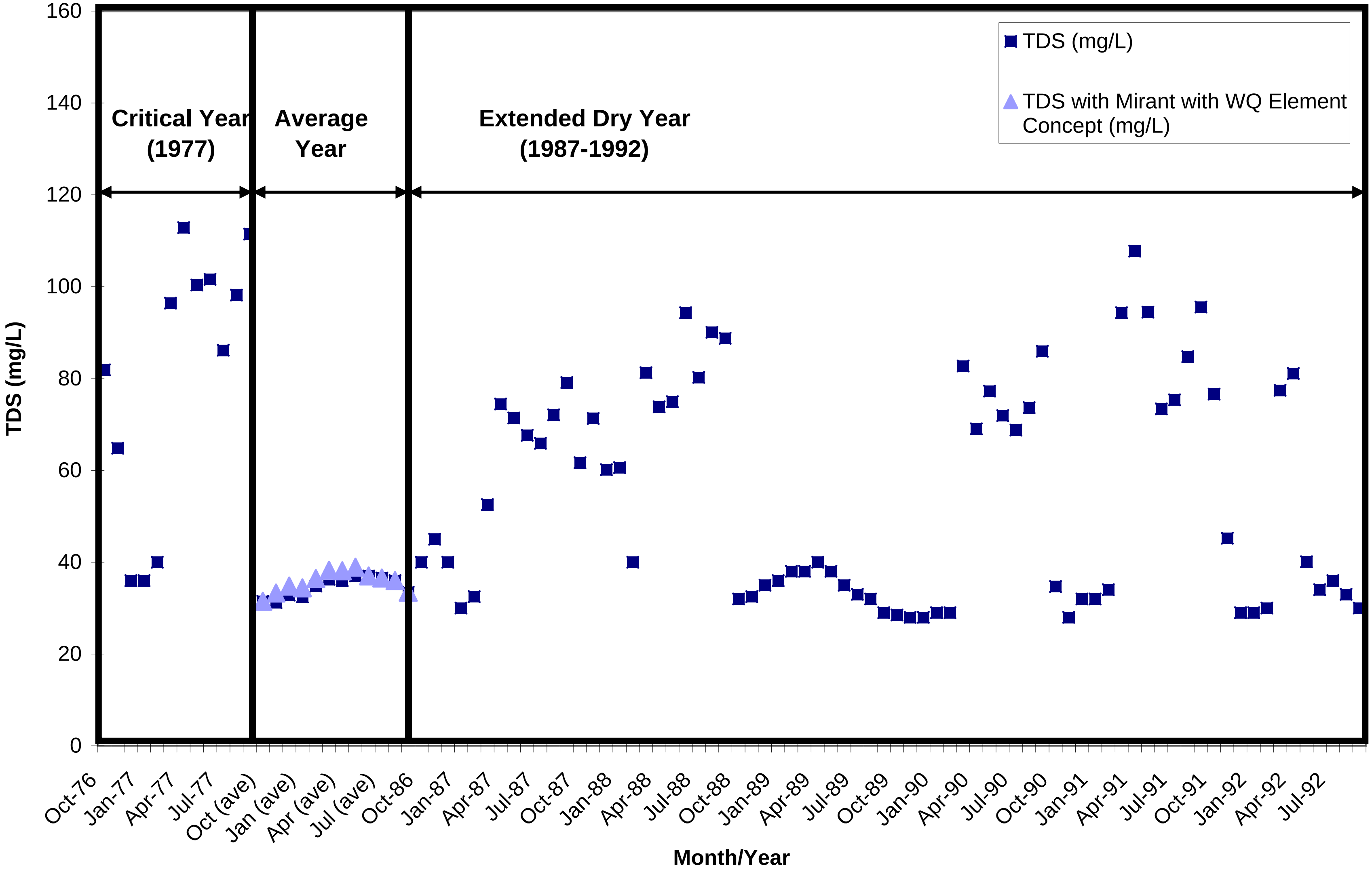
Concept: Mirant Desalination with Water Quality Element

Comparison of Zone 7 Baseline Source Water TDS with Mirant Desalination with Water Quality Element Concept TDS



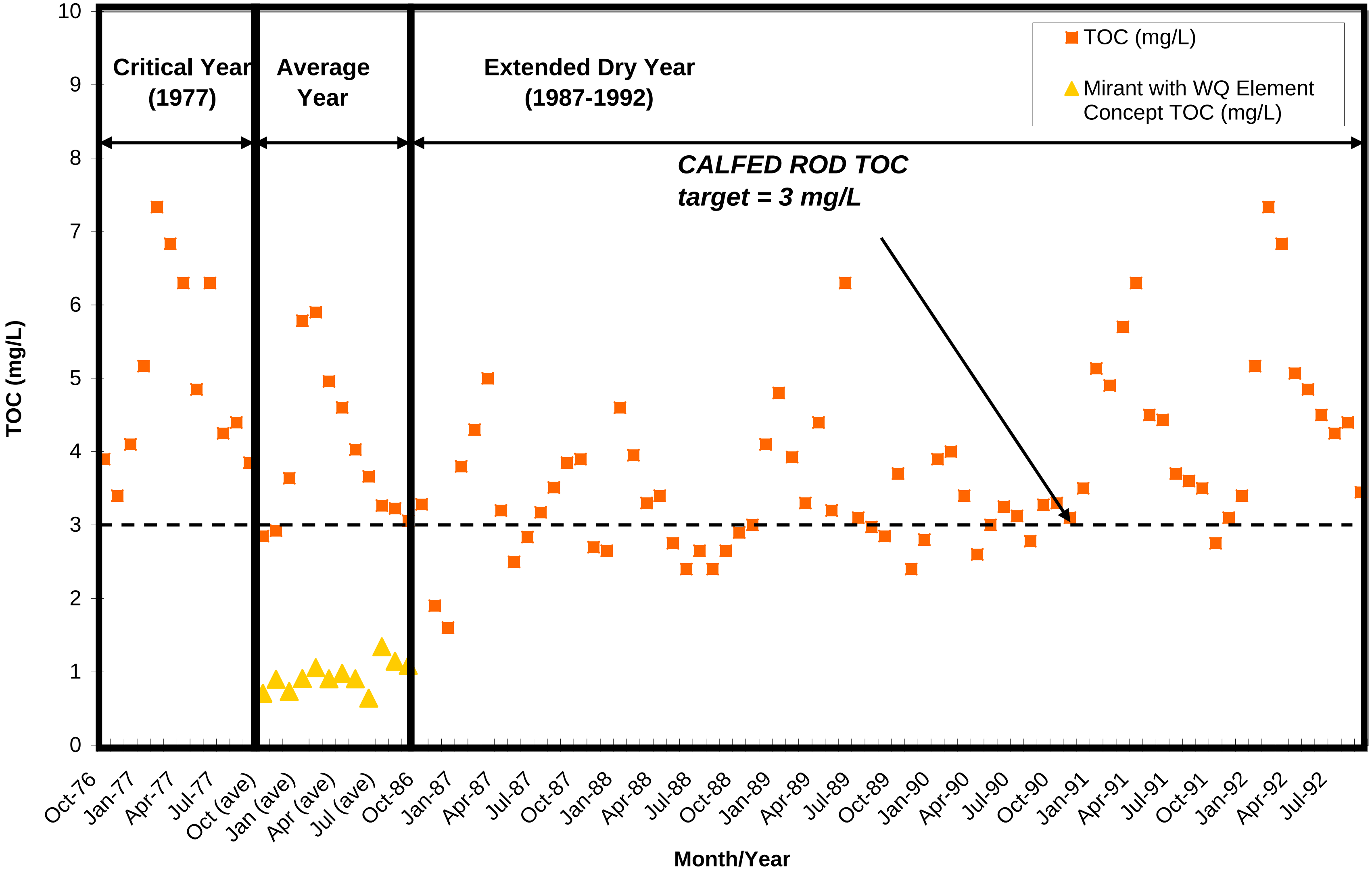
Concept: Mirant Desalination with Water Quality Element

Comparison of EBMUD Baseline Source Water TDS with Mirant Desalination with Water Quality Element Concept TDS



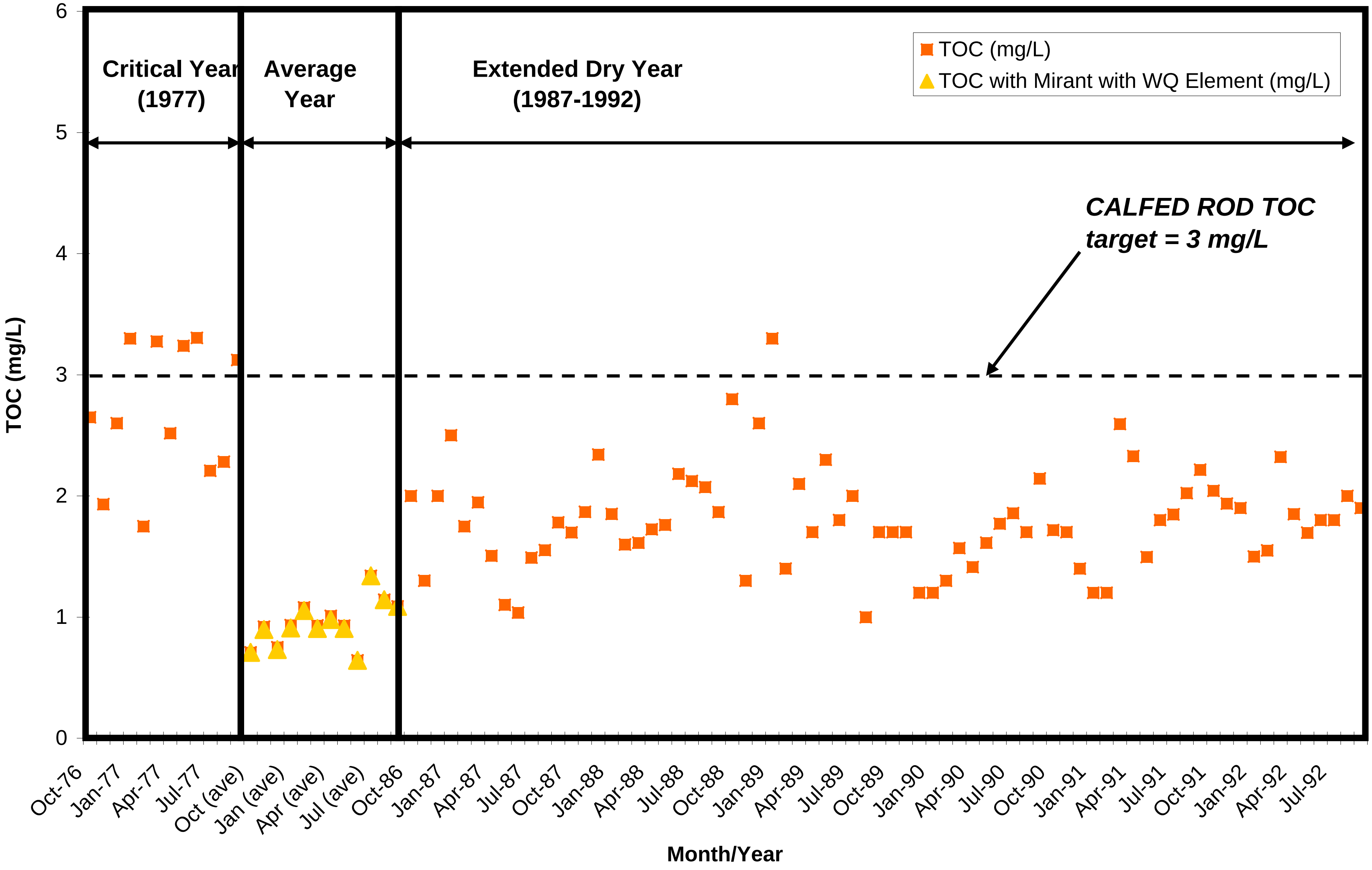
Concept: Mirant Desalination with Water Quality Element

Comaprison of Zone 7 Baseline Source Water TOC with Mirant Desalination with Water Quality Element Concept TOC



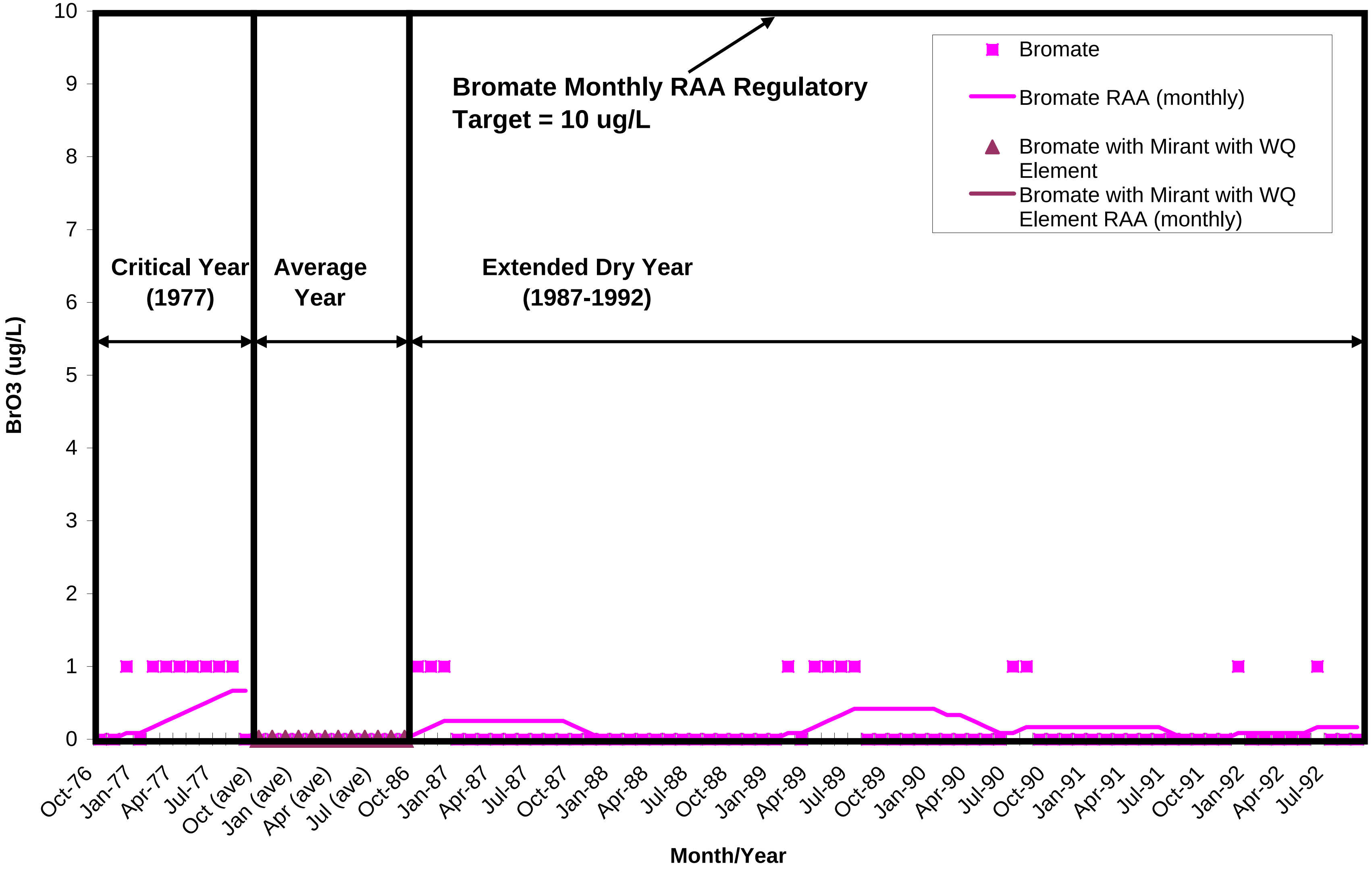
Concept: Mirant Desalination with Water Quality Element

Comparison of EBMUD Baseline Source Water TOC with Mirant Desalination with Water Quality Element Concept TOC

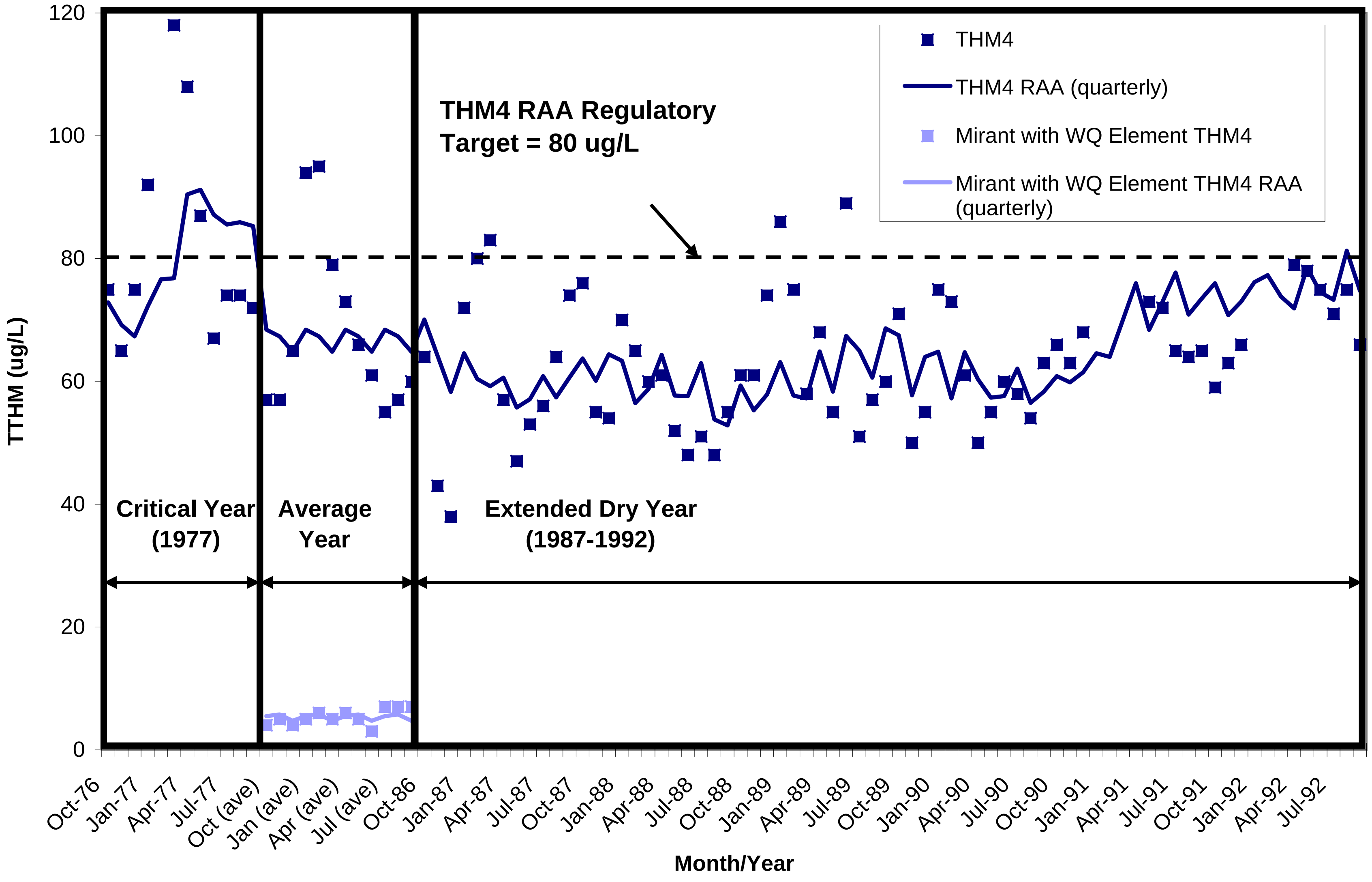


Concept: Mirant Desalination with Water Quality Element

Comparison of EBMUD Baseline Bromate with Mirant Desalination with Water Quality Element Concept Bromate



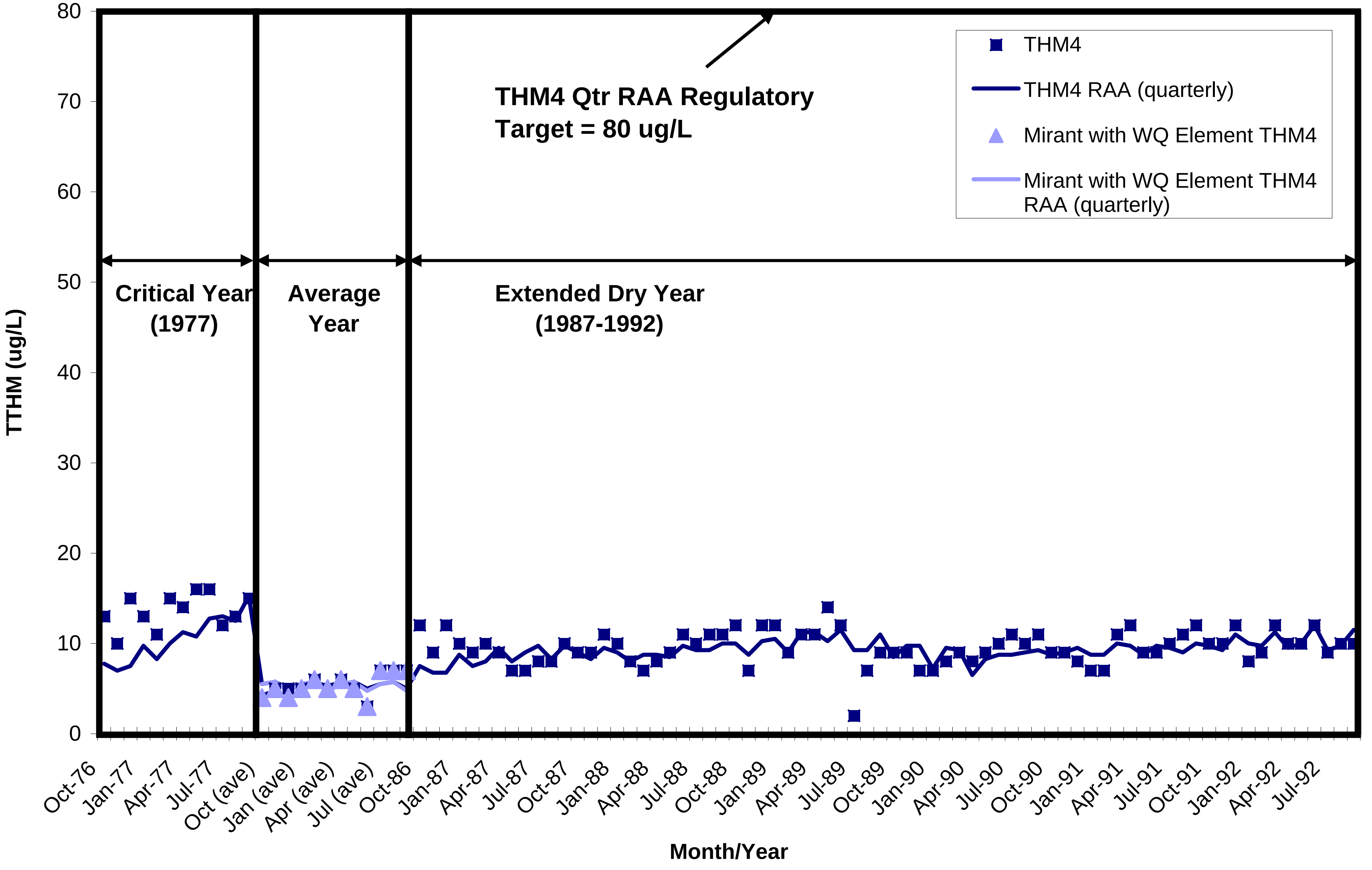
Concept: Mirant Desalination with Water Quality Element



Comparison of Zone 7 Baseline THM4 with Mirant Desalination with Water Quality Element Concept THM4

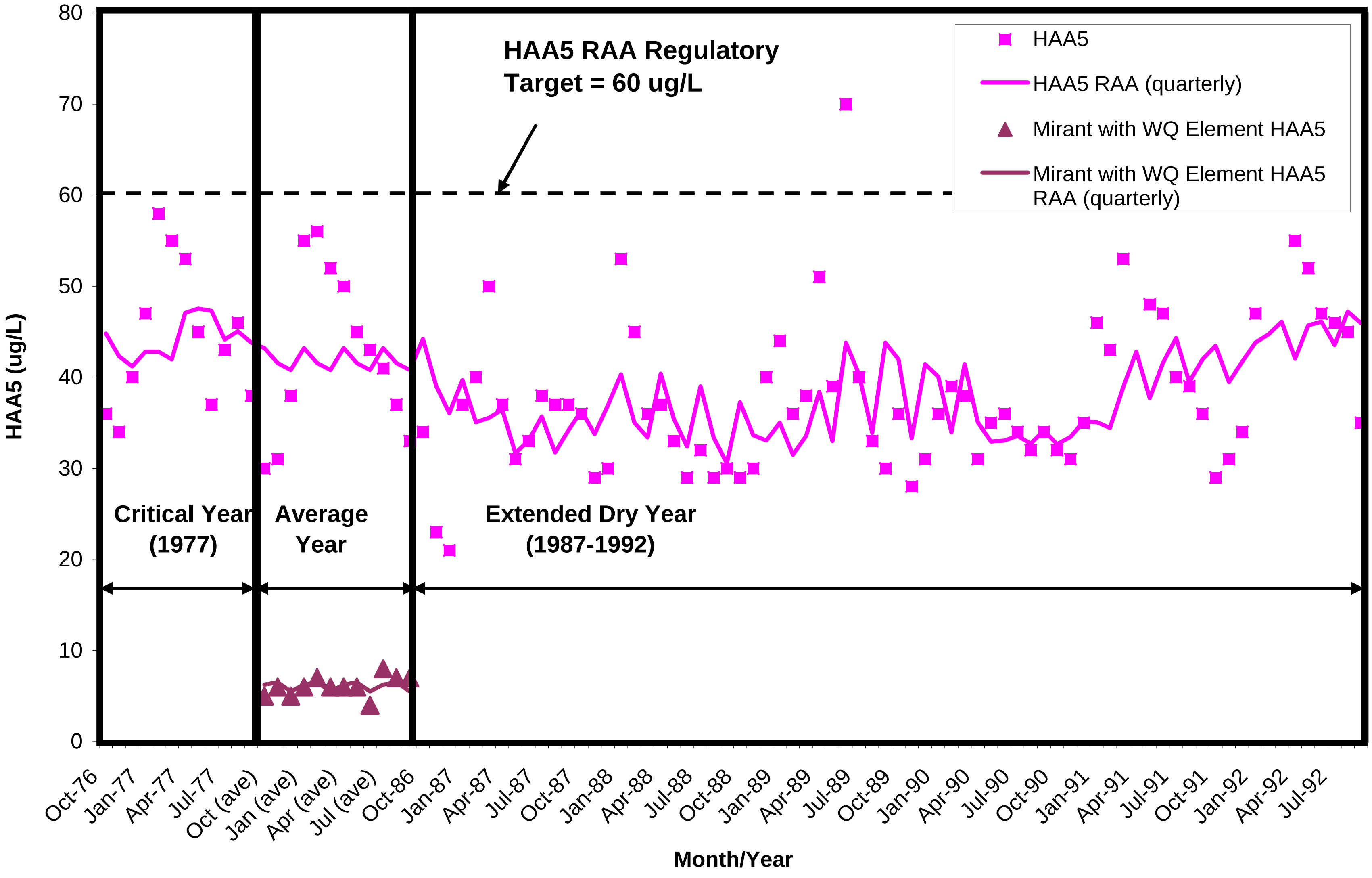
Concept: Mirant Desalination with Water Quality Element

Comparison of EBMUD Baseline THM4 with Mirant Desalination with Water Quality Element Concept THM4



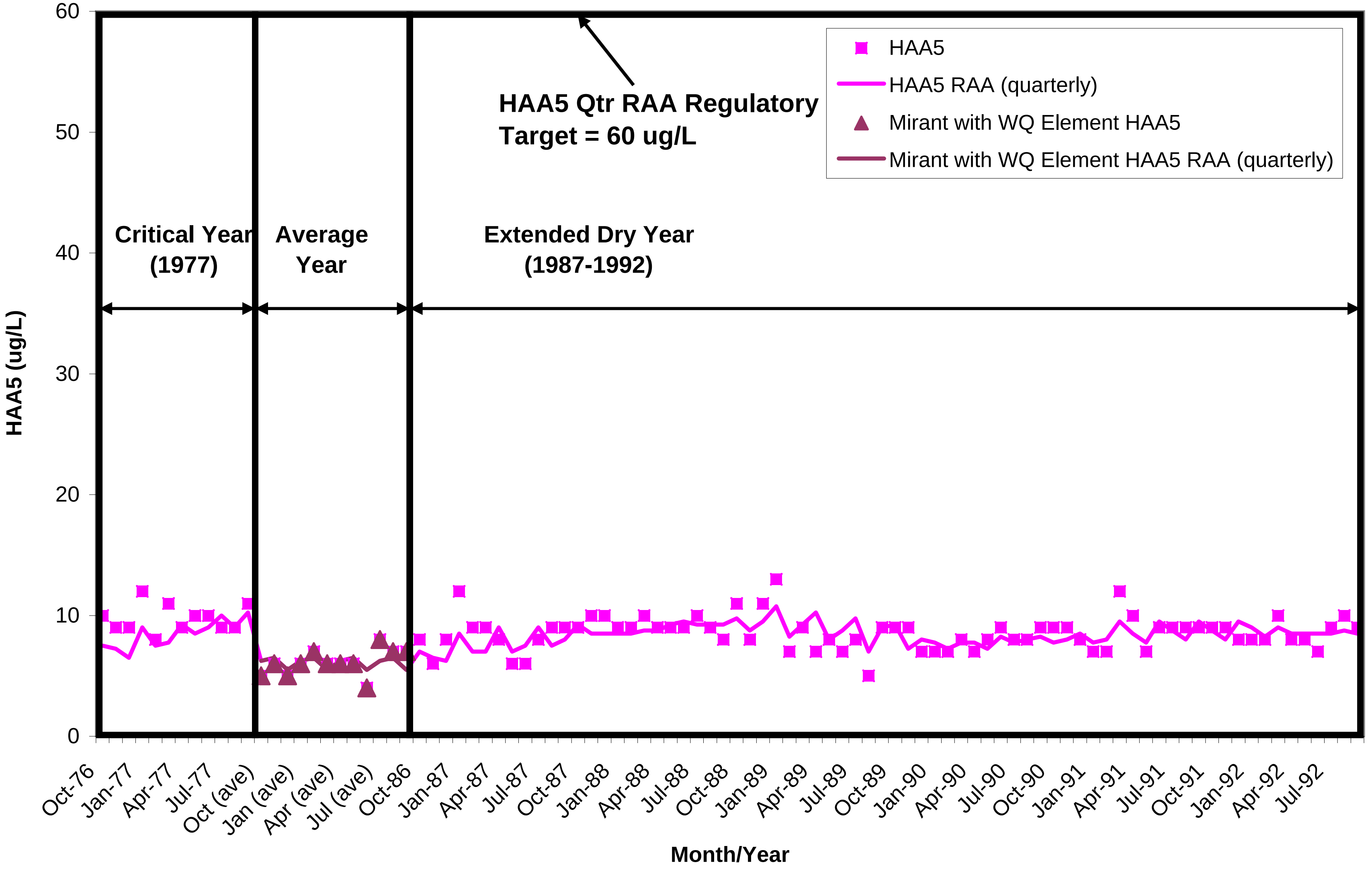
Concept: Mirant Desalination with Water Quality Element

Comparison of Zone 7 Baseline HAA5 with Mirant Desalination with Water Quality Element Concept HAA5



Concept: Mirant Desalination with Water Quality Element

Comparison of EBMUD Baseline HAA5 with Mirant Desalination with Water Quality Element Concept HAA5



G7 Near Bay Bridge Desalination with Water Quality Element

G7 Near Bay Bridge Desalination with Water Quality Element

DESCRIPTION

The Near Bay Bridge Desalination with Water Quality Element concept would involve location of a desalination plant near the EBMUD Regional Wastewater Treatment Plant (WWTP), located in Oakland at the eastern end of the Bay Bridge. The plant could be sized up to 40 MGD. According to EBMUD, there is insufficient space at the WWTP for addition of a desalination facility. Implementation of this concept would require the acquisition of additional property from the Port of Oakland or the former Oakland Army Base. This concept is a variation on the project described in the Bay Area Regional Desalination Project Pre-Feasibility Study (RDP PFR, 2003). It has not been evaluated by the Regional Desalination Project. In contrast to the regional study, which evaluated this concept principally for dry-year supply for the four regional partners, this study is evaluating the potential to also provide average year water quality benefits to interested agencies, including those who are not currently partners in the RDP. Additional analysis will be required to address potential environmental, institutional, cost-sharing and other issues if this concept appears feasible.

Near Bay Bridge Desalination with Water Quality Element Concept Summary

Extended Dry Year Supply ....up to 43,000 AFY

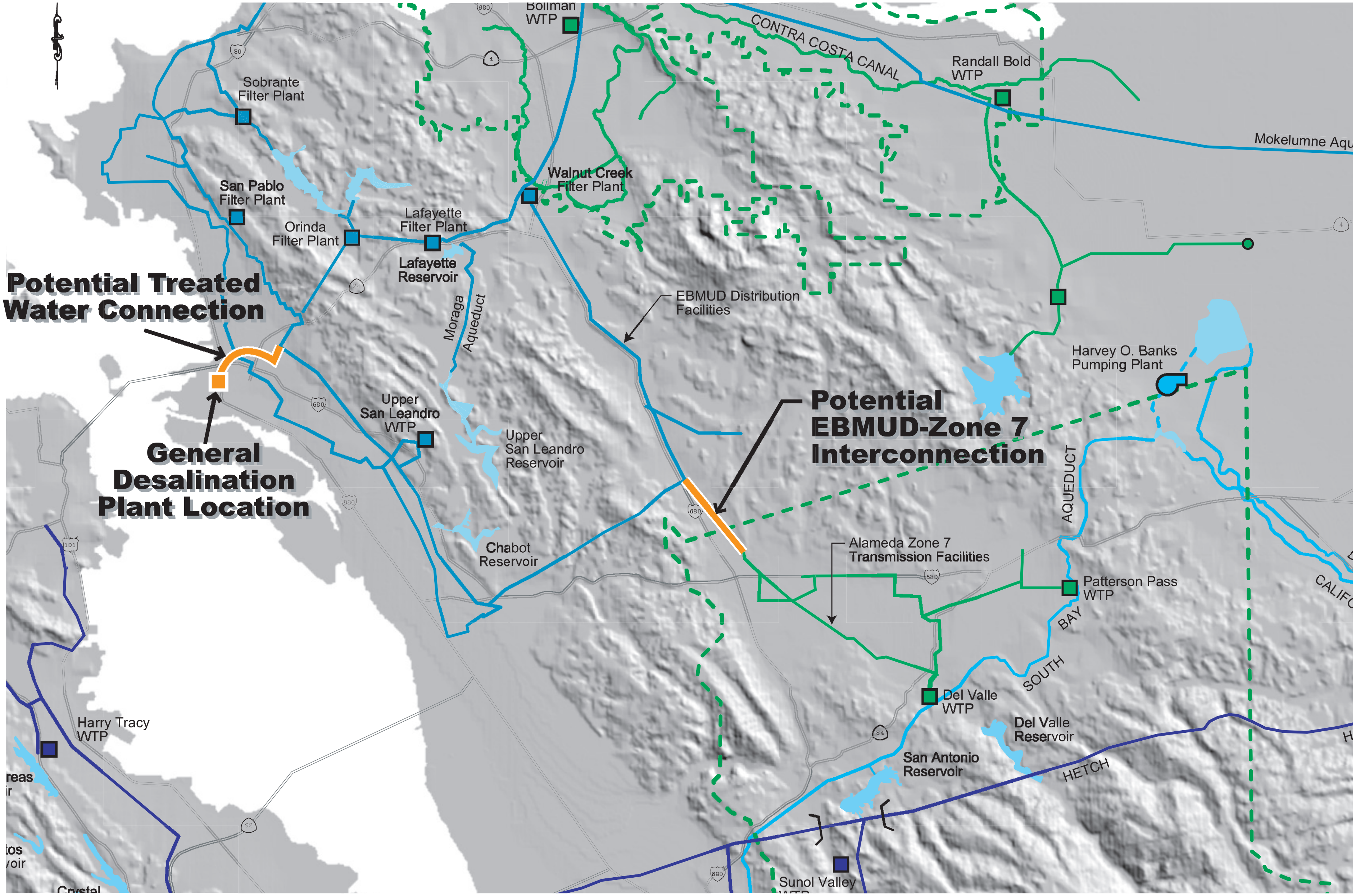
Average Year Water Quality Supply ....up to 10,000 AFY

Cost
Capital Cost ....TBD in future studies
O&M Cost ....TBD in future studies
Unit Cost..TBD in future studies

Potential Owning Agency
EBMUD

Potential Partners
Zone 7 Water Agency

The Bay Area agency potentially interested in this concept is the Zone 7 Water Agency. Supply from the Near Bay Bridge Desalination with Water Quality Element concept would potentially be conveyed through the EBMUD distribution system for delivery to Zone 7. This water could be used directly by the Zone 7 retail customers or injected into the groundwater basin. This concept assumes that water delivered to Zone 7 would be Near Bay Bridge desalinated water purchased by Zone 7. This study assumed an intertie size of up to 20 MGD, with a potential annual transfer of up to 10,000 acre-feet in average or wet hydrologic years. Water would be conveyed through EBMUD's West of Hills system, Southern Loop Pipeline, and East of Hills system to a new interconnection to Zone 7.



Legend

🟧 Potential Pipeline Alignment

CDM

Figure G7-1

Near Bay Bridge Desalination Regional View

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Concept: Near Bay Bridge Desalination with Water Quality Element

Table G7-1 - Supply Reliability Score Card[1]

Performance Measure/Objective	Agency Baseline		Near Bay Bridge Desalination with Water Quality Element Concept		Agency Baseline Plus Near Bay Bridge Desalination with Water Quality Element		Notes/Other
	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	
Meet Demands	Compares supply from concept with baseline supply						
Critical Drought							EBMUD could receive dry-year supply for its West of Hills (WOH) System. In winter months of average and wet years, water could be conveyed to Zone 7 via the WOH system, and Southern Loop, and East of Hills (EOH) System, to a new interconnection sized to deliver up to 20 MGD to the Zone 7 system, when excess capacity is available in the EBMUD distribution system. Specific plant locations, allocations or exchange with other partner agencies will be determined as part of the Regional Desalination Project. This concept, which is a variation on the RDP (and is not being evaluated in the RDP), evaluates only the Near Bay Bridge site and includes potential average water quality deliveries to Zone 7, who is not an RDP partner agency. Zone 7 would not be a recipient of dry-year supply.
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply[2]	*176,800*	*AFY*	*TBD[2]*	*AFY*	*TBD[2]*	*AFY*	
EBMUD Supply[3]	*200,430*	*AFY*	*Up to 43,000*	*AFY*	*Up to 243,430*	*AFY*	
SCVWD Supply[2]	*39,400*	*AFY*	*TBD[2]*	*AFY*	*TBD[2]*	*AFY*	
SFPUC Supply[2]	*157,000*	*AFY*	*TBD[2]*	*AFY*	*TBD[2]*	*AFY*	
Zone 7 Supply[4]	38,900	AFY	0	AFY	38,900	AFY	
Total Supply[5]	*612,530*	*AFY*	*Up to 43,000*	*AFY*	*Up to 655,530*	*AFY*	
Extended Drought							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply[2]	*170,800*	*AFY*	*TBD[2]*	*AFY*	*TBD[2]*	*AFY*	
EBMUD Supply[3]	*216,420*	*AFY*	*Up to 43,000*	*AFY*	*Up to 255,590*	*AFY*	
SCVWD Supply[2]	*63,000*	*AFY*	*TBD[2]*	*AFY*	*TBD[2]*	*AFY*	
SFPUC Supply[2]	*255,000*	*AFY*	*TBD[2]*	*AFY*	*TBD[2]*	*AFY*	
Zone 7 Supply[4]	56,400	AFY	0	AFY	56,400	AFY	
Total Supply[5]	*761,620*	*AFY*	*Up to 43,000*	*AFY*	*Up to 804,620*	*AFY*	
Average Year							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	255,590	AFY	0	AFY	255,590	AFY	
SCVWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SFPUC Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Zone 7 Supply[4]	71,400	AFY	Up to 10,000	AFY	71,400	AFY	
Total Supply[5]	326,990	AFY	Up to 10,000	AFY	326,990	AFY	
Vulnerability							
ACWD	N/A		N/A				
BAWSCA Agencies	N/A		N/A				
CCWD[2]	*Delta supply sources susceptible to liquefaction of Delta levees.*		*TBD[2]*				
EBMUD	*Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.*		*Reduces Vulnerability - This concept would provide additional reliability in the case of full or partial loss of the Mokelumne supply or Mokelumne Aqueducts. It would not provide against loss due to a seismic event either on the Hayward or Calaveras faults.*				
SCVWD[2]	*Delta supply sources susceptible to liquefaction of Delta levees.*		*TBD[2]*				
SFPUC[2]	*Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.*		*TBD[2]*				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Provides separate connection point to Zone 7 if South Bay Aqueduct were interrupted. Availability limited to winter months of average years, during non-emergency conditions in EBMUD system.				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would control the water quality element of the concept locally.							

1. This concept consists of average and wet year water quality deliveries to Zone 7, and is dependent upon the base desalination facility, which is part of the Regional Desalination Project. Shaded cells reflect potential benefits associated with the base desalination facility, to be determined by the Regional Desalination Project. Unshaded cells reflect incremental benefits associated with the concept (water quality element).

2. All RDP partners will benefit from the desalination facility in dry years. The quantity and operations will be determined in future phases of the RDP process.

3. EBMUD would take up to 43,000 MGD of dry year supply as necessary to meet demand, and would not take supply in excess of demand.

4. Zone 7 would use up to 10,000 AFY of supply in average years to offset existing, lower quality supplies.

5. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoic double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Concept: Near Bay Bridge Desalination with Water Quality Element

Table G7-2 - Public Health Protection Scorecard[1]

Concept: Near Bay Bridge Desalination with Water Quality Element

Performance Measure/Objective	Concept		Baseline Plus Concept		Notes
	Near Bay Bridge Desalination with Water Quality Element Source Water	Near Bay Bridge Desalination with Water Quality Element Treated Water	Near Bay Bridge Desalination with Water Quality Element Source Water	Near Bay Bridge Desalination with Water Quality Element Treated Water	
Variability for Treatment					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	NA	NA	No impact on source water quality.
SCVWD					
SFPUC					
Zone 7	NA	NA	NA	NA	No impact on source water quality.
Total Dissolved Solids					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	Increases TDS	NA	NA	TDS target slightly higher than EBMUD TDS.
SCVWD					
SFPUC					
Zone 7	NA	Reduces TDS	NA	NA	Improved quality over Zone 7 average year TDS.
Disinfection By-Products					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	Reduces DBPs	NA	NA	All DBPs reduced for EBMUD customers receiving Near Bay Bridge water. However, due to elevated bromide levels, a higher fraction of brominated DBPs are expected.
SCVWD					
SFPUC					
Zone 7	NA	Reduces DBPs	NA	NA	All DBPs reduced for Zone 7 customers receiving Near Bay Bridge water.
Taste and Odor Problems (Excluding TDS)					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	Degrades T&O	NA	NA	Reduced overall quality. Bromide and TDS increased.
SCVWD					
SFPUC					
Zone 7	NA	Improves T&O	NA	NA	Improved overall quality for customers receiving Near Bay Bridge water.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD					Near Bay Bridge water quality is slightly degraded as compared with EBMUD baseline, but represents an improvement over the Zone 7 baseline.
BAWSCA Agencies					
CCWD					
EBMUD	NA	Increases Potential for Degradation	NA	NA	
SCVWD					
SFPUC					
Zone 7	NA	Reduces Potential for Degradation	NA	NA	
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD					Emerging contaminants such as algal biotoxins may be a factor with desalinated bay water supplies.
BAWSCA Agencies					
CCWD					
EBMUD	NA	Increases Potential for Degradation	NA	NA	
SCVWD					
SFPUC					
Zone 7	NA	Increases Potential for Degradation	NA	NA	

1. Scores reflect water quality effects resulting from conveyance of Near Bay Bridge Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

Concept: Near Bay Bridge Desalination with Water Quality Element

Table G7-2a - Public Health Protection Score Card by Agency[1]

Agency: EBMUD

			Agency Baseline[2]		**Concept**[3]		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**EBMUD Source Water**	**EBMUD Treated Water**	**Near Bay Bridge Desalination with Water Quality Element Source Water**	**Near Bay Bridge Desalination with Water Quality Element Treated Water**	**Agency Baseline Near Bay Bridge Desalination with Water Quality Element Source Water**	**Agency Baseline Near Bay Bridge Desalination with Water Quality Element Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	200,430		0		243,430		
Extended Dry Year		AFY	216,420		0		255,590		
Average Year		AFY	255,590		0		255,590		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.05	0.01 - 0.04	NA	NA	NA	NA	
	Mean	mg/L	0.03	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.8 - 3.3	1.1 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	2.7	1.9	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	ND - 0.05	0.00 - 0.05	NA	NA	NA	NA	
	Mean	mg/L	0.02	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.0 - 3.3	0.5 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	1.8	1.1	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.01	0.01 - 0.01	NA	0.11 - 0.11	NA	NA	Elevated bromide levels are expected.
	Mean	mg/L	0.01	0.01	NA	0.11	NA	NA	
TOC	Range	mg/L	0.6 - 1.3	0.1 - 0.7	NA	0.1 - 0.1	NA	NA	
	Mean	mg/L	1.0	0.4	NA	0.1	NA	NA	
pH	Qual		somewhat variable	constant	NA	somewhat variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	36 - 113	56 - 133	NA	NA	NA	NA	
	Mean	mg/L	80	100	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	28 - 108	48 - 128	NA	NA	NA	NA	
	Mean	mg/L	55	75	NA	NA	NA	NA	
Average Year	Range	mg/L	31 - 37	51 - 57	NA	150 - 150	NA	NA	
	Mean	mg/L	35	54	NA	150	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	1	NA	NA	NA	NA	
THM4	Range	ug/L	NA	10 - 16	NA	NA	NA	NA	
	Mean	ug/L	NA	14	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	8 - 12	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	2 - 14	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	5 - 13	NA	NA	NA	NA	
	Mean	ug/L	NA	9	NA	NA	NA	NA	
Average Year									
Bromate	Range	ug/L	NA	ND	NA	0 - 0	NA	NA	
	Mean	ug/L	NA	ND	NA	0	NA	NA	
THM4	Range	ug/L	NA	3 - 7	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	5	NA	1	NA	NA	
HAA5	Range	ug/L	NA	4 - 8	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	6	NA	1	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	No agencies receive source water from this concept.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. Scores reflect water quality effects resulting from conveyance of Near Bay Bridge Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. Baseline water quality data was collected from EBMUD and is detailed in the EBMUD section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Near Bay Bridge finished water only, and do not reflect the effects of blending with EBMUD supplies. For the purposes of this study, Near Bay Bridge Desalination permeate TDS was approximated at 150 mg/L.

Concept: Near Bay Bridge Desalination with Water Quality Element

Table G7-2b - Public Health Protection Score Card by Agency[1]

Agency: Zone 7

			Agency Baseline[2]			Concept[3]		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Near Bay Bridge Desalination with Water Quality Element Source Water**	**Near Bay Bridge Desalination with Water Quality Element Treated Water**	**Agency Baseline Plus Near Bay Bridge Desalination with Water Quality Element Source Water**	**Agency Baseline Plus Near Bay Bridge Desalination with Water Quality Element Treated Water**	**Notes**
Supply Quantity										
Critical Year		AFY	38,900			0		38,900		
Extended Dry Year		AFY	56,400			0		56,400		
Average Year		AFY	71,400			10,000		71,400		
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	NA	0.11 - 0.11	NA	NA	
	Mean	mg/L	0.19	0.15	0.15	NA	0.11	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	NA	0.1 - 0.1	NA	NA	
	Mean	mg/L	4.0	3.7	3.7	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	somewhat variable	NA	NA	SBA pH is widely variable, but is buffered during treatment. Near Bay Bridge permeate pH is less variable.
Temperature	Qual		variable	less variable	less variable	NA	variable	NA	NA	SBA temperature is variable.
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	NA	NA	
	Mean	mg/L	507	517	517	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	NA	NA	
	Mean	mg/L	384	394	394	NA	NA	NA	NA	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	NA	150 - 150	NA	NA	
	Mean	mg/L	296	306	306	NA	150	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	NA	
	Mean	ug/L	NA	86	89	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	NA	
	Mean	ug/L	NA	44	46	NA	NA	NA	NA	
Extended Dry Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	NA	
	Mean	ug/L	NA	67	67	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	NA	
	Mean	ug/L	NA	39	39	NA	NA	NA	NA	
Average Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	ND	NA	NA	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	68	69	NA	1	NA	NA	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	43	43	NA	1	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	No agencies receive source water from this concept.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	

1. Scores reflect water quality effects resulting from conveyance of Near Bay Bridge Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. Baseline water quality data is detailed in the Zone 7 section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Near Bay Bridge finished water only, and do not reflect the effects of blending with EBMUD or Zone 7 supplies. For the purposes of this study, Near Bay Bridge Desalination permeate TDS was approximated at 150 mg/L.

Concept: Near Bay Bridge Desalination with Water Quality Element

Table G7-3 - Cost, Environmental and Implementation Score Card[1]

	Concept	
Performance Measure/Objective	**Amount or Rating**	**Notes/Other**
Cost Impacts		
Total Cost		
Capital Cost	TBD[2]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
Operating & Maintenance Cost	TBD[2]	
Environmental Mitigation Cost	TBD[2]	
Lifecycle Cost	TBD[2]	
Allocation of Costs	TBD[2]	Allocation of Costs will not be determined as part of this study.
Environmental Impacts[3]		
Overall Impacts to Environment[3]	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
Overall Benefits to Environment[3]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential		
External Support	TBD[2] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically	
Ability to Get Outside Funding	TBD[2] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well	
Consistency with Local and Regional Plans	TBD[2] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
Population Receiving Benefits	280,000 people	

1. Scores reflect incremental effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.
2. To be determined in future studies.
3. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Concept: Near Bay Bridge Desalination with Water Quality Element

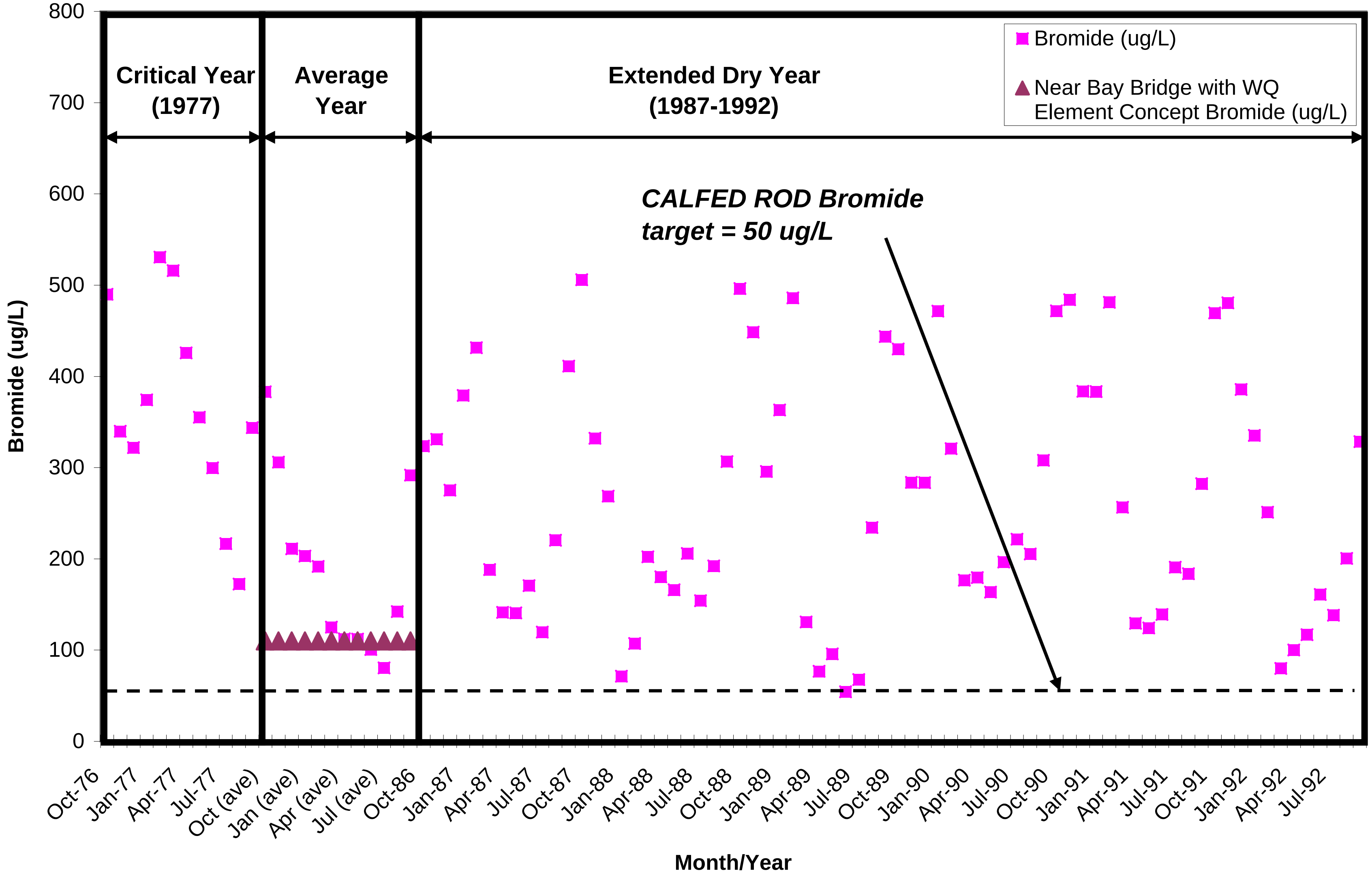
Table G7-4 - Environmental Score Card [1]

Performance Measure/Objective	Concept Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 10,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been established, so the actual biological effects cannot be determined. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, such effects would likely be temporary in nature. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but are not be limited to, restriction on construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to, preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[2].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[2].** Further evaluation would be required to determine the level of impact and mitigation opportunities.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

1. Scores reflect incremental effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.
2. To be determined in future studies.

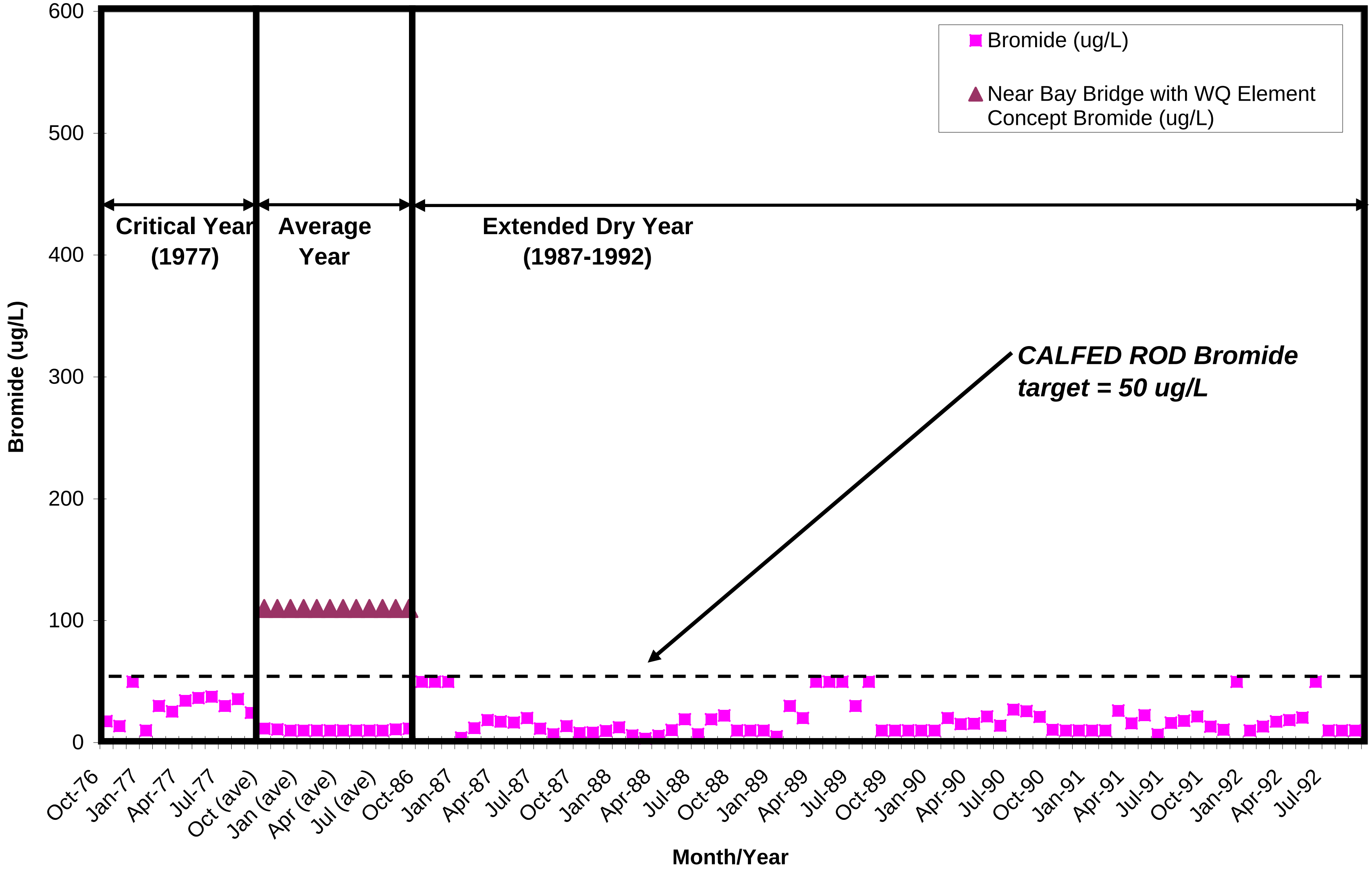
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of Zone 7 Baseline Source Water Bromide with Near Bay Bridge Desalination with Water Quality Element Concept Bromide



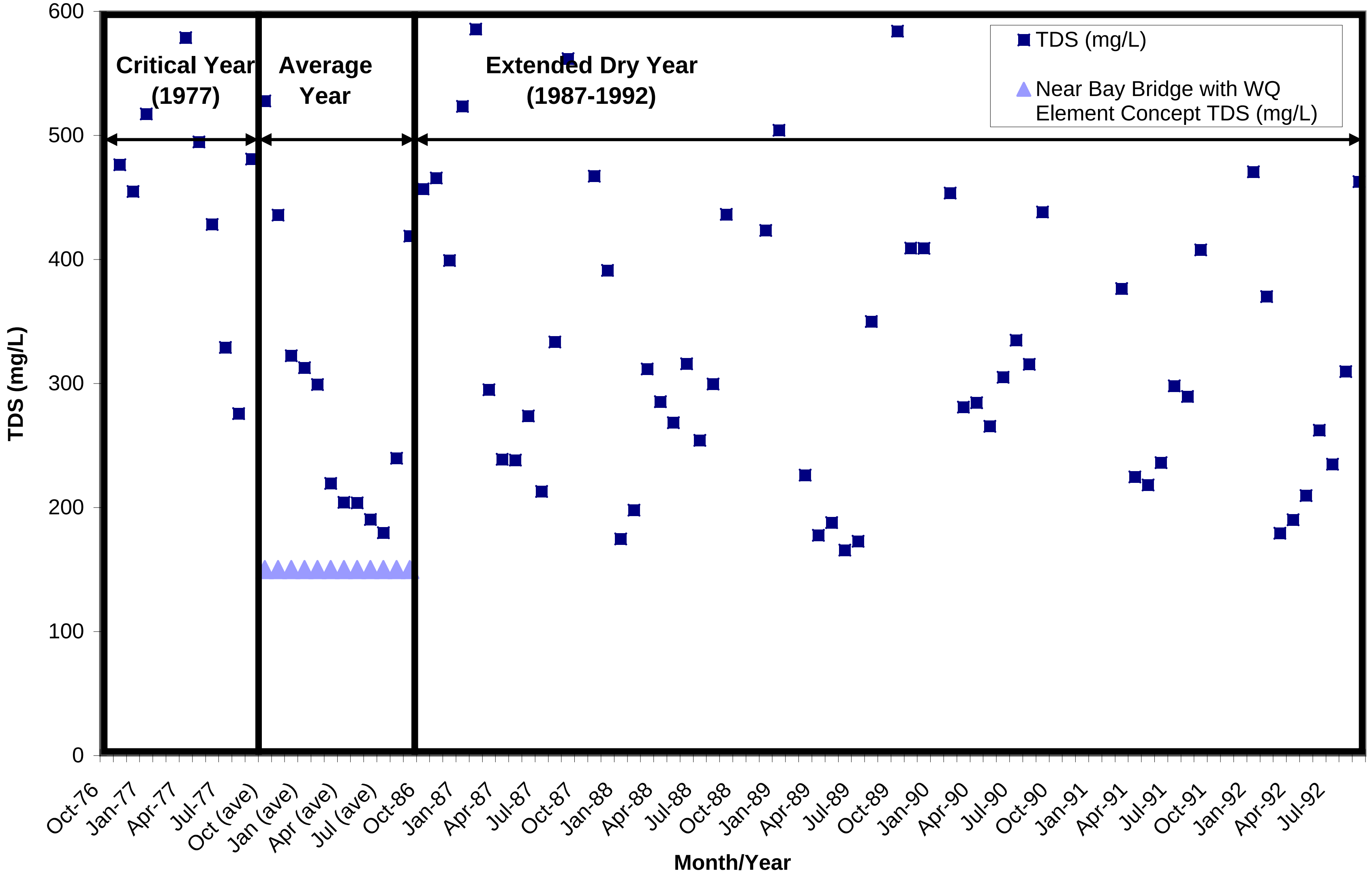
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of EBMUD Baseline Source Water Bromide with Near Bay Bridge Desalination with Water Quality Element Concept Bromide



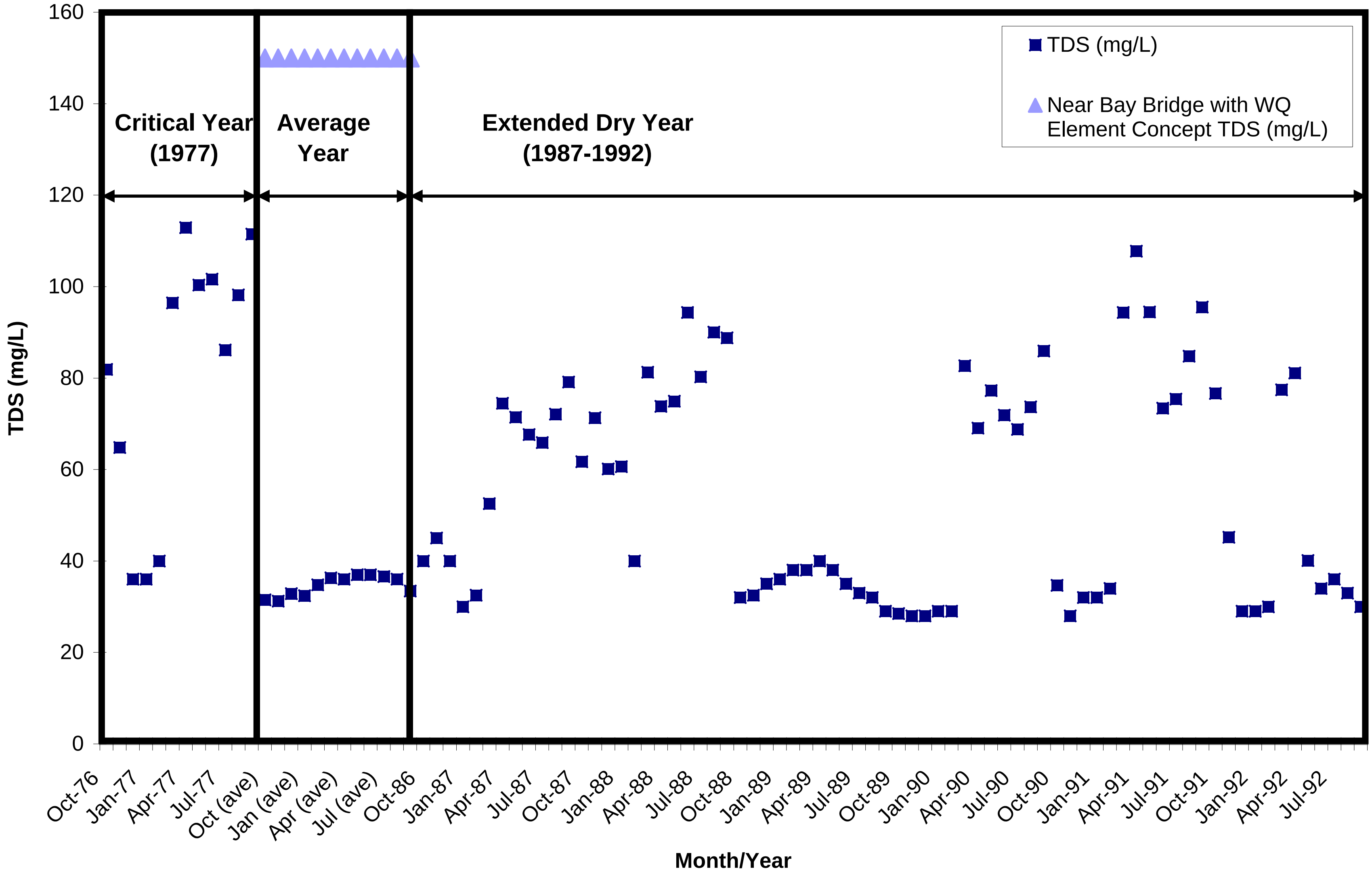
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of Baseline Zone 7 Source Water TDS with Near Bay Bridge Desalination with Water Quality Element Concept TDS



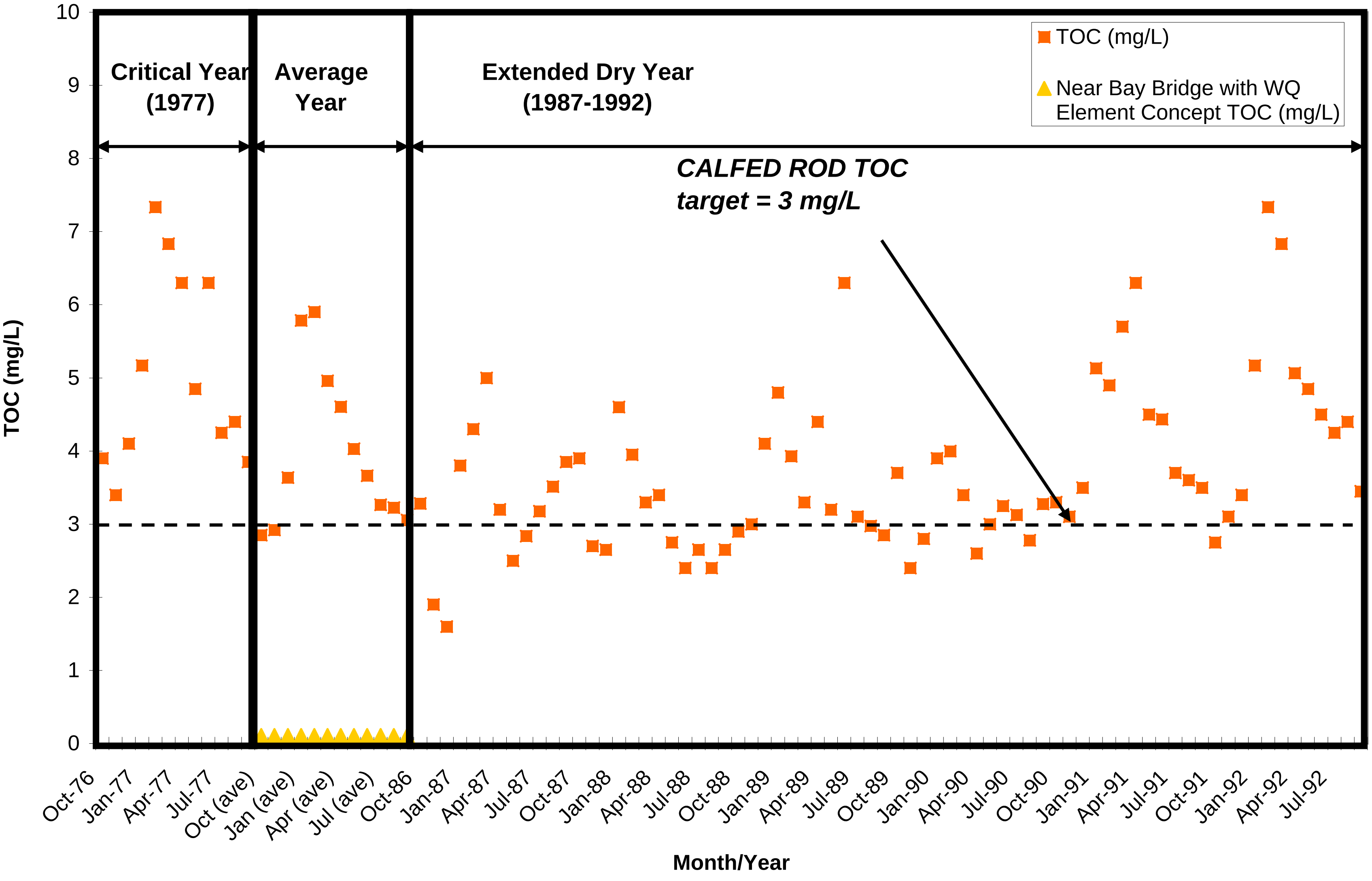
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of EBMUD Baseline Source Water TDS with Near Bay Bridge Desalination with Water Quality Element Concept TDS



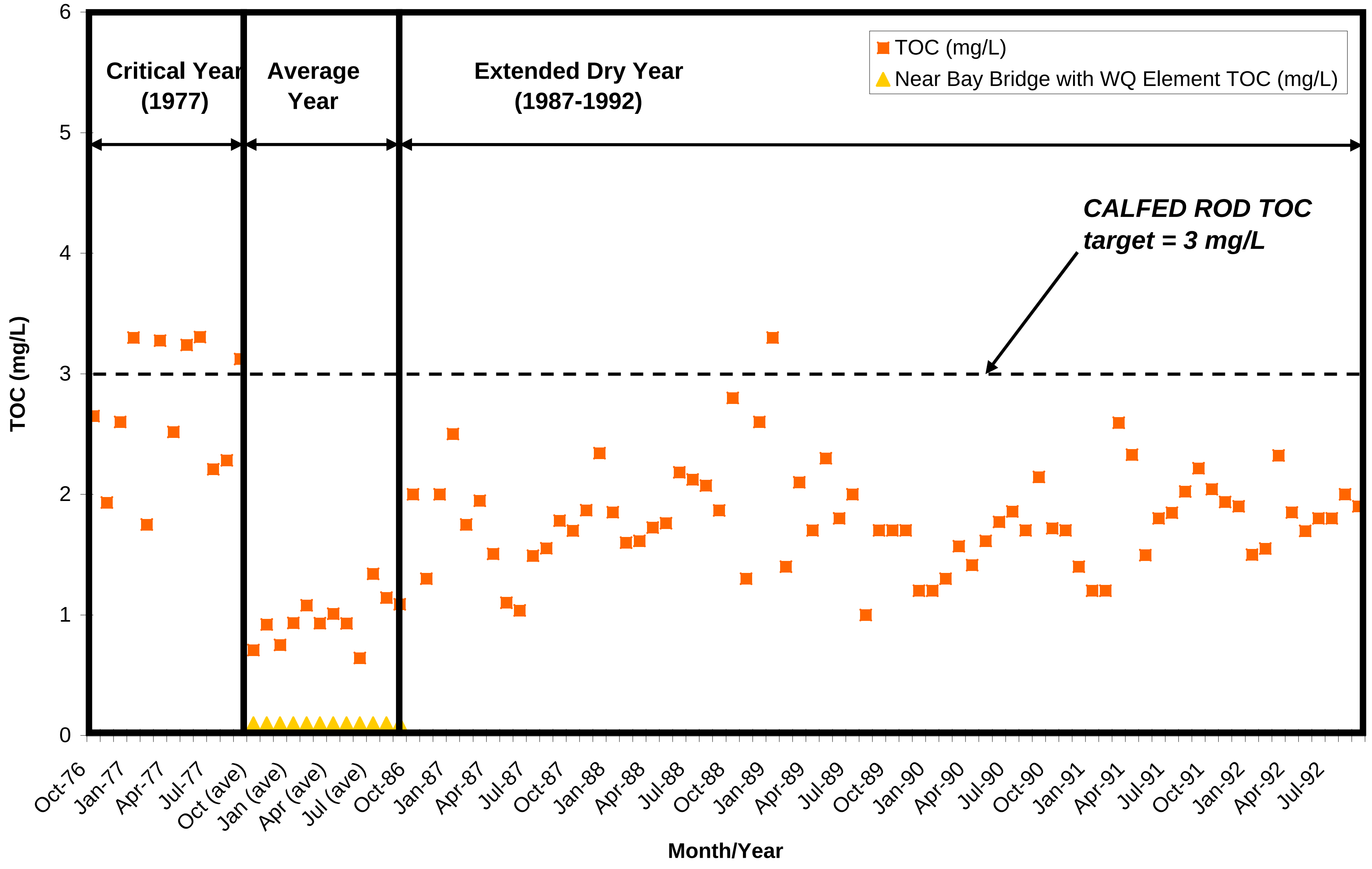
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of Zone 7 Baseline Source Water TOC with Near Bay Bridge Desalination with Water Quality Element Concept TOC



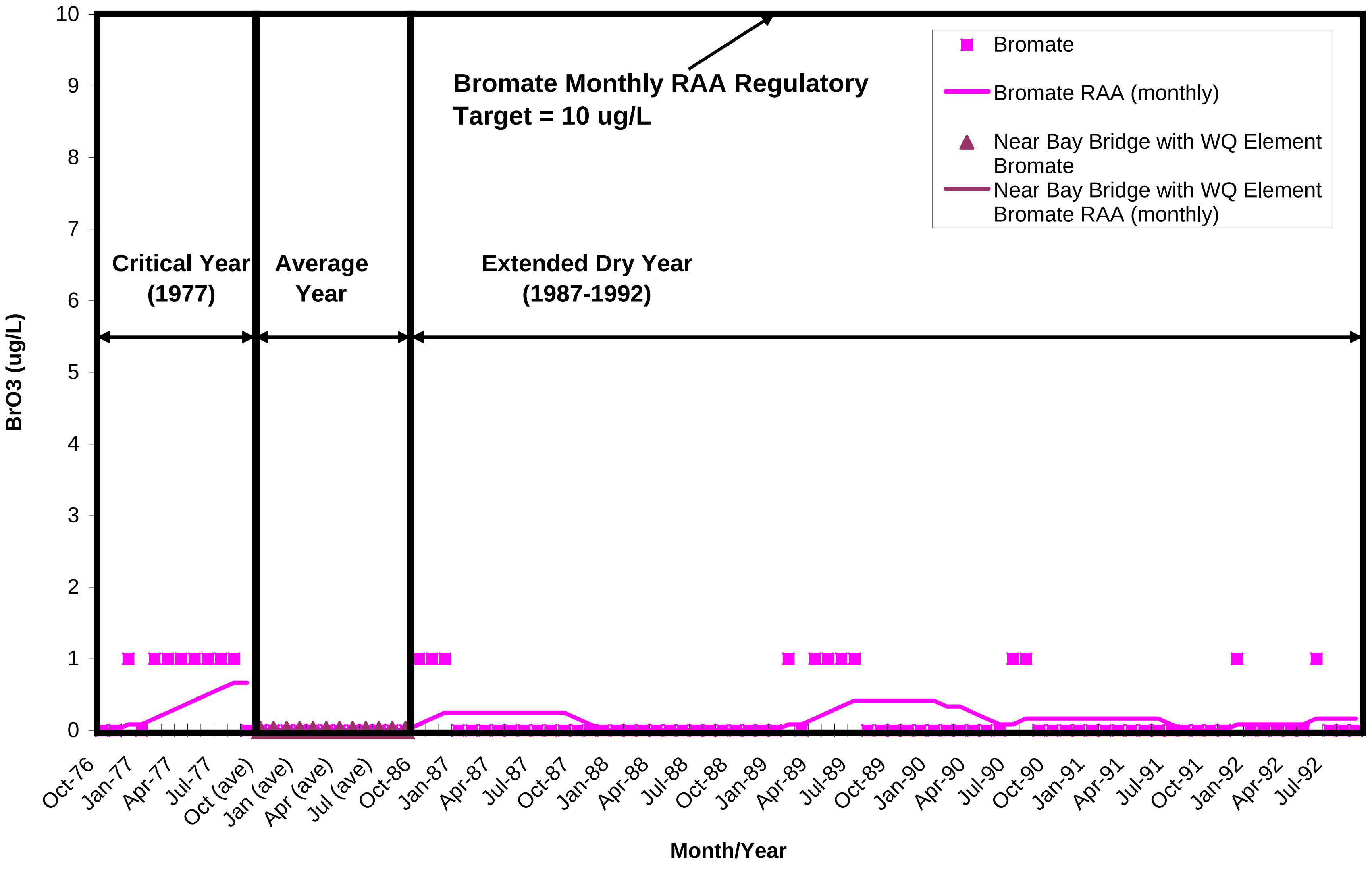
Concept: Near Bay Bridge Desalination with Water Quality Element

Comaprison of EBMUD Baseline Source Water TOC with Near Bay Bridge Desalination with Water Quality Element Concept TOC



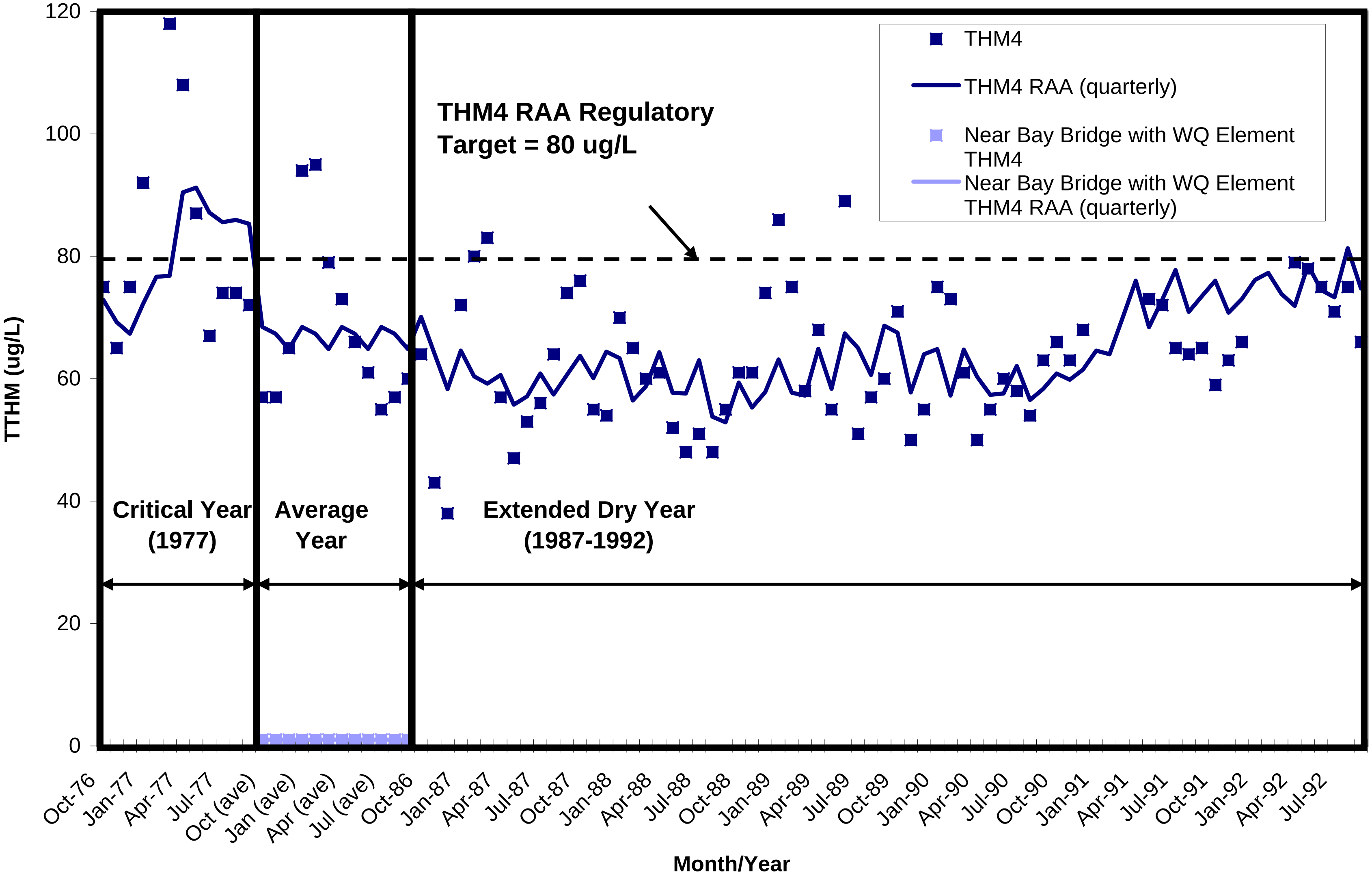
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of EBMUD Baseline Bromate with the Near Bay Bridge Desalination with Water Quality Element Concept Bromate



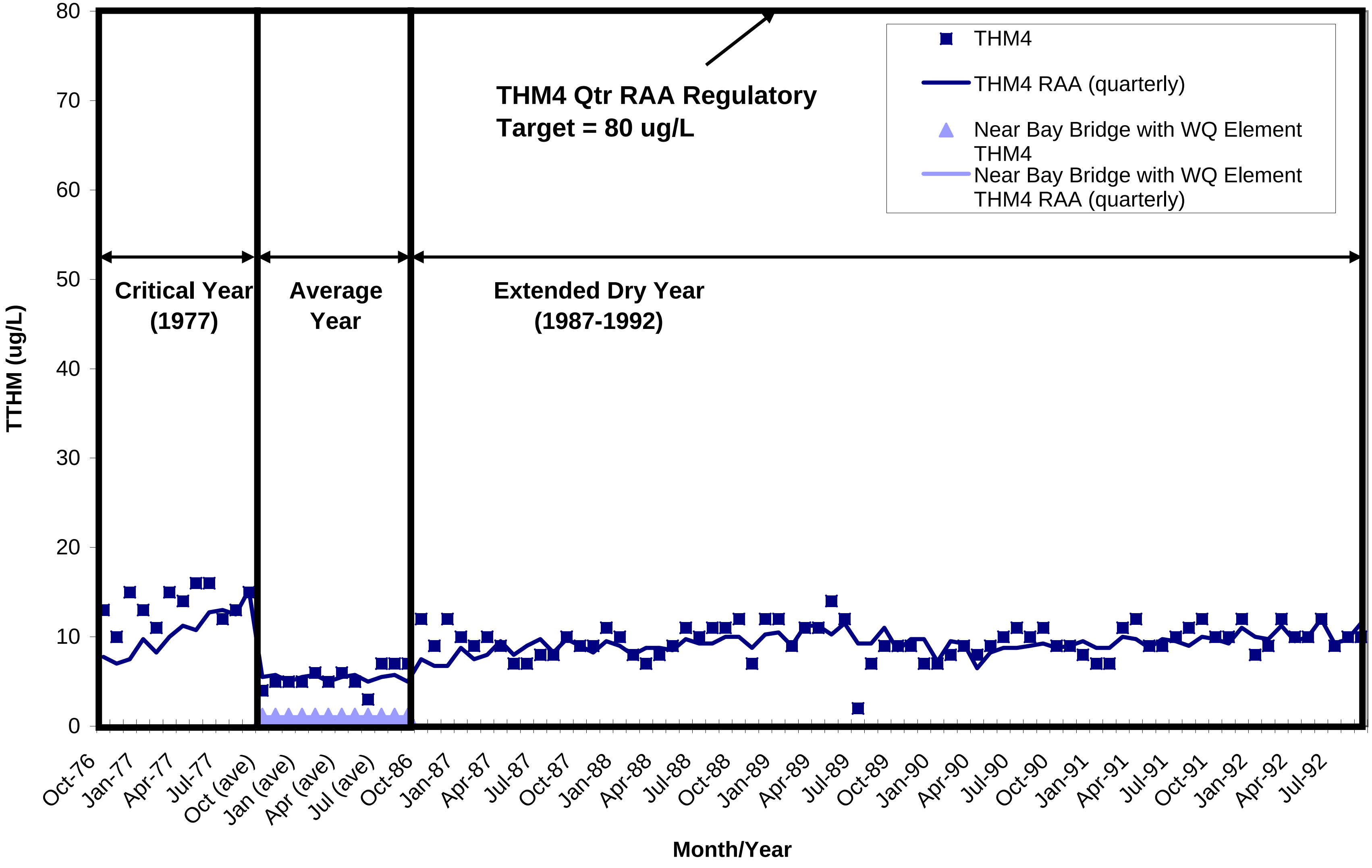
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of Zone 7 Baseline THM4 with Near Bay Bridge Desalination with Water Quality Element Concept THM4



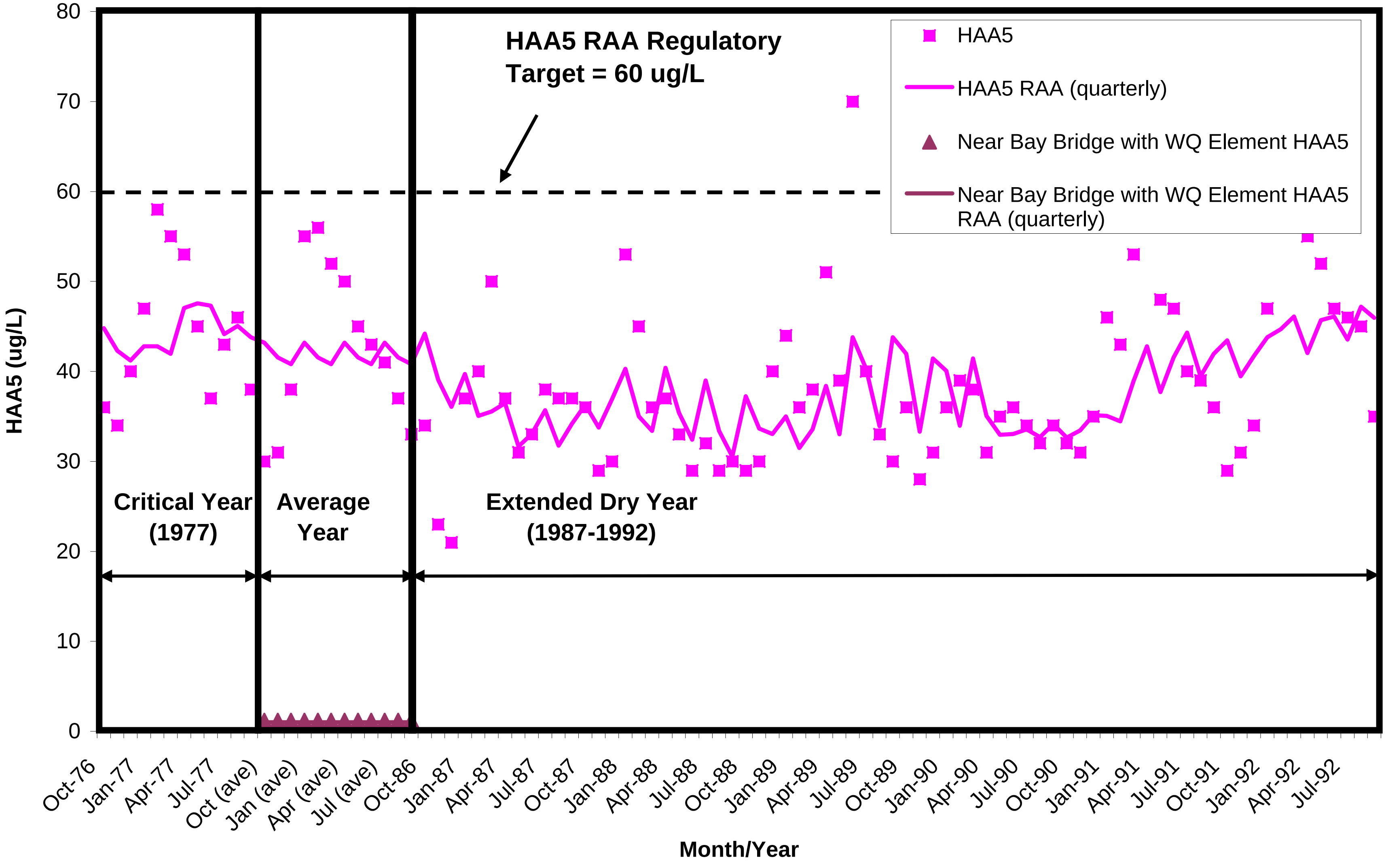
Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of EBMUD Baseline THM4 with Near Bay Bridge Desalination with Water Quality Element Concept THM4

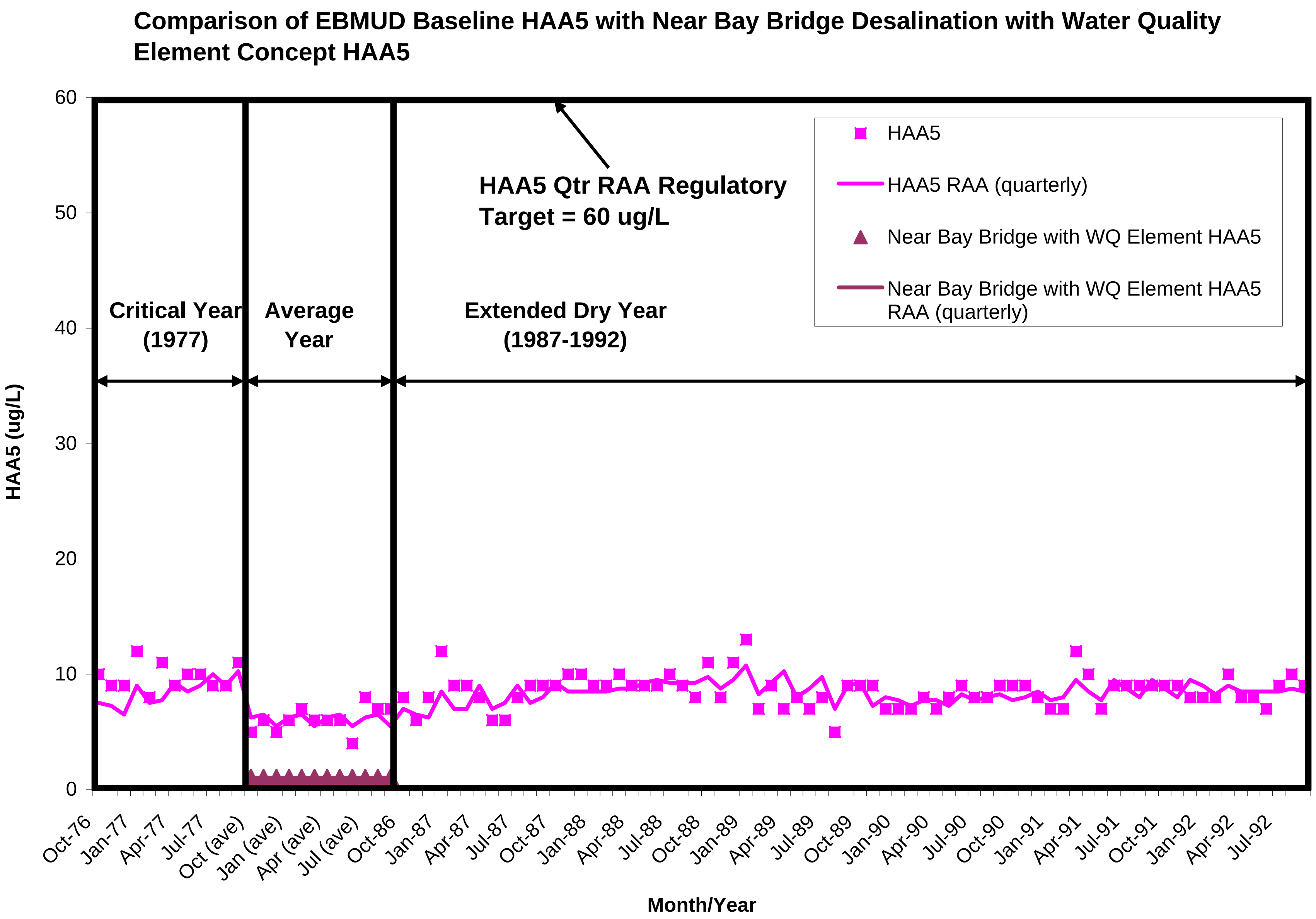


Concept: Near Bay Bridge Desalination with Water Quality Element

Comparison of Zone 7 Baseline HAA5 with Near Bay Bridge Desalination with Water Quality Element Concept HAA5



Concept: Near Bay Bridge Desalination with Water Quality Element



G8 South Bay Desalination – Irrigation and Industrial Use

G8 South Bay Desalination – Irrigation and Industrial Uses

DESCRIPTION

The South Bay Desalination – Irrigation and Industrial Uses concept would involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer for irrigation and/or industrial cooling uses. The upper aquifer is currently only used for small local domestic or agricultural purposes, or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control Plant (WQCP) in Palo Alto. Each of these plants is assumed to have a treated water production capacity of up to 1 million gallons per day (MGD)[1]. These concepts were evaluated in the regional desalination study (RDP PFR, 2003) that evaluates potential regional desalination plant sites to provide drought and emergency supply. The South Bay Desalination concepts received only a preliminary evaluation in the regional study and were not carried forward in the detailed cost and operational analysis because of their small capacity. The detail included in this analysis has not been evaluated by the RDP. Additional analysis will be required to address potential environmental, water rights, institutional and other issues if this concept appears feasible.

South Bay Desalination – Irrigation and Industrial Uses Concept Summary

Extended Dry Year Supply	up to 3,200 AFY
Average Year Water Quality Supply	up to 3,200 AFY

Cost Per Facility ($2005)

Capital Cost	$14 - $17 M
O&M Cost	$2.6 M/Year
Unit Cost	$1,100 /AF

Potential Owning Agency
SCVWD

Potential Partners
SCVWD, SFPUC(1), BAWSCA

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

Potential participants are the Cities of Palo Alto, Santa Clara, and San Jose, which are SFPUC/SCVWD common customers. The total available dry-year supply for the concept is up to 3,200 AFY, based on three plants of 1 MGD treated water production each and with plants operating 95 percent of the time. A facility at the Palo Alto Regional WQCP could provide Palo Alto with up to 1 MGD of dry-year supply, freeing up SFPUC potable supply for delivery to other SFPUC wholesale or retail customers if the supply is not needed to meet demand in Palo Alto. A facility sited at the Pico Power Plant in Santa Clara could potentially provide up to 1 MGD of dry-year supply for Santa Clara, freeing up either SCVWD or SFPUC potable water for delivery to other customers if the supply is not needed to meet demand in Santa Clara. A facility at Los Esteros Power Plant, located within the North San Jose/Alviso service area of the San Jose Municipal Water System (SJMWS) could also potentially provide up to 1 MGD to offset use of groundwater or SFPUC purchases by SJMWS, increasing local groundwater dry-year yields, or freeing up potable water for delivery to other SFPUC wholesale or retail customers if the supply is not needed to meet future growth in SJMWS.

Project Facilities for South Bay Desalination – Irrigation and Industrial Uses Concept

Facility	Notes
Desalination Facilities • Groundwater wells • 1 to 1.1-MGD pipelines from wells to desalination plant • Pre- and post-treatment systems • 0.4 to 0.7-MGD reverse osmosis treatment • 0.2-MGD brine disposal via power plant cooling water return or Bay discharge	RO system with energy recovery, 14 milligrams per liter (mg/L) TDS RO water, 290-500 mg/L TDS for finished water after blending.
Pump Station • To be determined in future studies	
Pipelines **From Pico Power Plant to SCVWD system** • To be determined in future studies **From Pico Power Plant to City of Santa Clara system** • To be determined in future studies	
From Los Esteros Plant to SJMWS system • To be determined in future studies	

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[1] Demand for desalinated supply for irrigation/industrial uses assumed to be 1 MGD per plant. Feed volumes are 1.1 MGD, blending to target TDS and assuming 80% recovery and 95% plant factor. Two target TDS concentrations were evaluated: 290 mg/L and 500 mg/L.

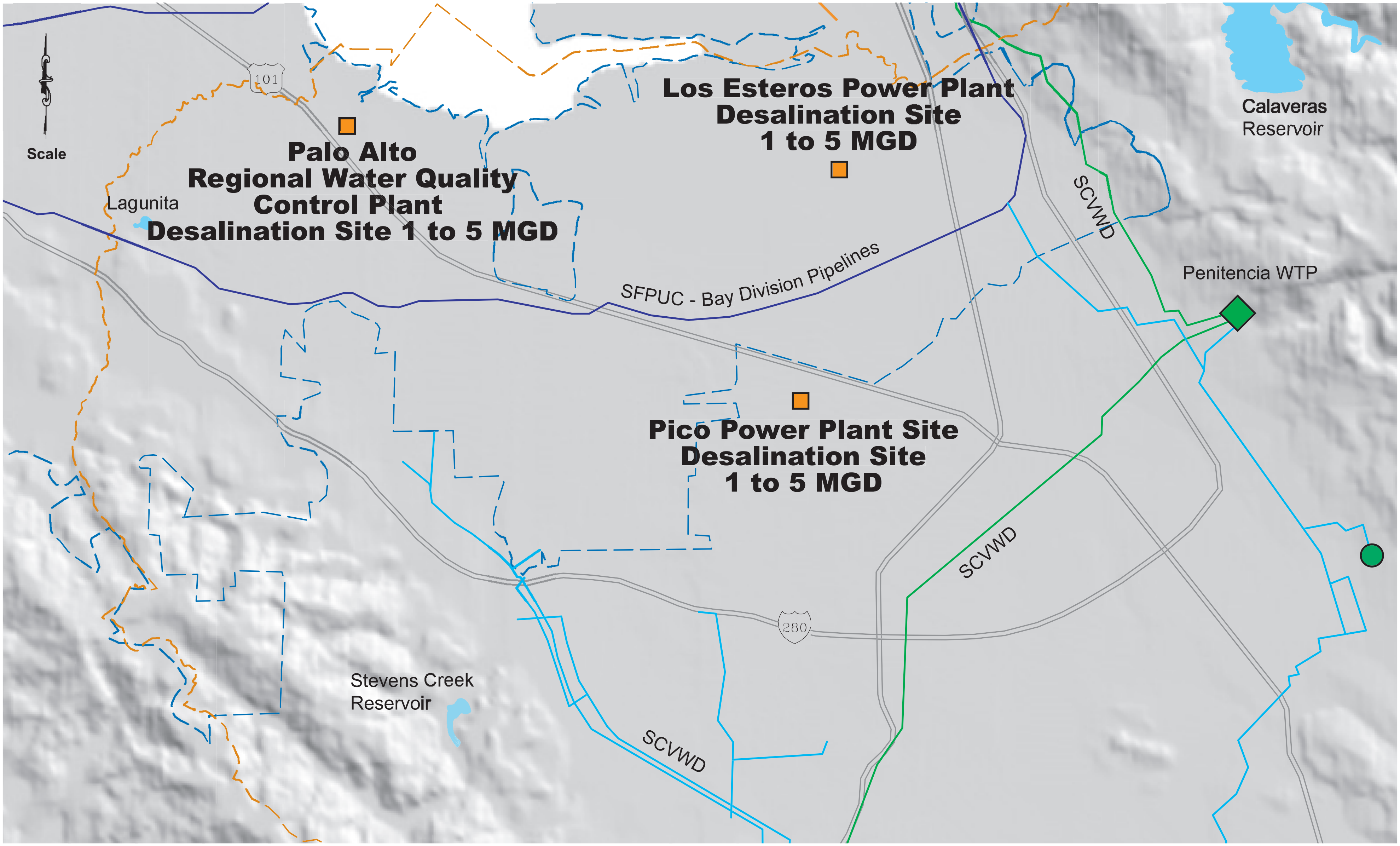

Figure G8-1
South Bay Desalination Potential Site Locations

Concept: South Bay Desalination - Irrigation and Industrial Use

Table G8-1 - Supply Reliability Score Card

Performance Measure/Objective	Agency Baseline		South Bay Desalination - Irrigation and Industrial Use		Agency Baseline Plus South Bay Desalination - Irrigation and		Notes/Other
	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	
Meet Demands	Compares supply from concept with baseline supply						
Critical Drought							BAWSCA, SFPUC, and SCVWD are all listed as beneficiaries. Projected desalinated supplies have not been partitioned as part of this project. Recipients include the City of Palo Alto, the City of Santa Clara, and the San Jose Municipal System.
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	137,800	AFY	Up to 3,200	AFY	Up to 141,000	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply	39,400	AFY	Up to 3,200	AFY	Up to 42,600	AFY	
SFPUC Supply	157,000	AFY	Up to 3,200	AFY	Up to 160,200	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[1]	196,400	AFY	Up to 3,200	AFY	Up to 199,600	AFY	
Extended Drought							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 3,200	AFY	Up to 213,100	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply	63,000	AFY	Up to 3,200	AFY	Up to 66,200	AFY	
SFPUC Supply	255,000	AFY	Up to 3,200	AFY	Up to 258,200	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[1]	318,000	AFY	Up to 3,200	AFY	Up to 321,200	AFY	
Average Year							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 3,200	AFY	345,000	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply	97,800	AFY	Up to 3,200	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	Up to 3,200	AFY	329,000	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[1]	426,800	AFY	Up to 3,200	AFY	426,800	AFY	
Vulnerability							
ACWD	N/A		N/A				
BAWSCA Agencies	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - Could provide small supply source in the event of a supply disruption.				
CCWD	N/A		N/A				
EBMUD	N/A		N/A				
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.		No Effect on Vulnerability - This concept provides nonpotable supply and will not affect the vulnerability of the SCVWD potable system.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		No Effect on Vulnerability - This concept provides nonpotable supply and will not affect the vulnerability of the SFPUC potable system.				
Zone 7	N/A		N/A				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within Region - Project would be locally controlled.							

1. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Concept: South Bay Desalination - Irrigation and Industrial Use

Table G8-2 - Public Health Protection Scorecard[1]

Concept: South Bay Desalination - Irrigation and Industrial Use

Performance Measure/Objective	Concept		Baseline Plus Concept		Notes
	Desalination - Irrigation and Industrial Use	Desalination - Irrigation and Industrial Use	Desalination - Irrigation and Industrial Use	Desalination - Irrigation and Industrial Use	
Variability for Treatment					
ACWD					
BAWSCA Agencies	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
CCWD					
EBMUD					
SCVWD	NA	NA	NA	NA	
SFPUC	NA	NA	NA	NA	
Zone 7					
Total Dissolved Solids					
ACWD					
BAWSCA Agencies	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will be substantially higher in TDS (up to 500 mg/L) than potable supplies, but will have no effect on potable water quality.
CCWD					
EBMUD					
SCVWD	NA	NA	NA	NA	
SFPUC	NA	NA	NA	NA	
Zone 7					
Disinfection By-Products					
ACWD					
BAWSCA Agencies	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will likely be lower in DBPs than potable supplies, due to lower chlorine demand from RO treatment, but will have no effect on potable water quality.
CCWD					
EBMUD					
SCVWD	NA	NA	NA	NA	
SFPUC	NA	NA	NA	NA	
Zone 7					
Taste and Odor Problems (Excluding TDS)					
ACWD					
BAWSCA Agencies	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will not be potable.
CCWD					
EBMUD					
SCVWD	NA	NA	NA	NA	
SFPUC	NA	NA	NA	NA	
Zone 7					
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD					
BAWSCA Agencies	Increases Potential for Degradation	Increases Potential for Degradation	NA	NA	Increased TDS in desalinated supplies displacing potable supplies used for the same purpose could have effects on the groundwater salt balance.
CCWD					
EBMUD					
SCVWD	Increases Potential for Degradation	Increases Potential for Degradation	NA	NA	
SFPUC	Increases Potential for Degradation	Increases Potential for Degradation	NA	NA	
Zone 7					
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD					
BAWSCA Agencies	No Effect on Potential for Degradation	No Effect on Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
CCWD					
EBMUD					
SCVWD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	NA	NA	
SFPUC	No Effect on Potential for Degradation	No Effect on Potential for Degradation	NA	NA	
Zone 7					

1. Two TDS targets were evaluated, 290 mg/L and 500 mg/L.

Concept: South Bay Desalination - Irrigation and Industrial Use

Table G8-2a - Public Health Protection Score Card by Agency [1]

Agency: SCVWD

			Agency Baseline		**Concept**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**South Bay Desalination - Irrigation and Industrial Use Source Water**	**South Bay Desalination - Irrigation and Industrial Use Treated Water**	**Agency Baseline Plus South Bay Desalination - Irrigation and Industrial Use Source Water**	**Agency Baseline Plus South Bay Desalination - Irrigation and Industrial Use Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	39,400		3,200		42,600		
Extended Dry Year		AFY	63,000		3,200		66,200		
Average Year		AFY	97,800		3,200		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.37	0.33	NA	0.17	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	5.1	3.9	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.26	0.24	NA	0.17	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	3.7	2.7	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.19	0.17	NA	0.17	NA	NA	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	4.0	3.0	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	290 - 500	NA	NA	
	Mean	mg/L	507	527	NA	395	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	290 - 500	NA	NA	
	Mean	mg/L	384	404	NA	395	NA	NA	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	290 - 500	NA	NA	
	Mean	mg/L	296	316	NA	395	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	6	NA	ND	NA	NA	
THM4	Range	mg/L	NA	27 - 44	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	34	NA	6	NA	NA	
HAA5	Range	mg/L	NA	11 - 14	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	13	NA	7	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	4	NA	ND	NA	NA	
THM4	Range	mg/L	NA	16 - 40	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	27	NA	6	NA	NA	
HAA5	Range	mg/L	NA	7 - 18	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	11	NA	7	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	3	NA	ND	NA	NA	
THM4	Range	mg/L	NA	22 - 34	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	27	NA	6	NA	NA	
HAA5	Range	mg/L	NA	9 - 15	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	12	NA	7	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	

1. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Concept: South Bay Desalination - Irrigation and Industrial Use

Table G8-2b - Public Health Protection Score Card by Agency [1]

Agency: SFPUC

			Agency Baseline		**Concept**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SFPUC Source Water**	**SFPUC Treated Water**	**South Bay Desalination - Irrigation and Industrial Use Source Water**	**South Bay Desalination - Irrigation and Industrial Use Treated Water**	**Agency Baseline Plus South Bay Desalination - Irrigation and Industrial Use Source Water**	**Agency Baseline Plus South Bay Desalination - Irrigation and Industrial Use Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	157,000		3,200		160,200		
Extended Dry Year		AFY	255,000		3,200		258,200		
Average Year		AFY	329,000		3,200		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.17	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	2.0	1.9	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.17	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	2.0	1.9	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.01	0.01	NA	0.17	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	1.7	1.6	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	290 - 500	NA	NA	
	Mean	mg/L	26	26	NA	395	NA	NA	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	290 - 500	NA	NA	
	Mean	mg/L	42	42	NA	395	NA	NA	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	290 - 500	NA	NA	
	Mean	mg/L	40	40	NA	395	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	34 - 47	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	38	NA	6	NA	NA	
HAA5	Range	mg/L	NA	28 - 40	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	32	NA	7	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	33 - 50	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	38	NA	6	NA	NA	
HAA5	Range	mg/L	NA	24 - 44	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	30	NA	7	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	24 - 43	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	33	NA	6	NA	NA	
HAA5	Range	mg/L	NA	22 - 34	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	28	NA	7	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Concept: South Bay Desalination - Irrigation and Industrial Use

Table G8-3 - Cost, Environmental and Implementation Score Card

	Concept	
Performance Measure/Objective	**Amount or Rating**	**Notes/Other**
Cost Impacts		
Total Cost		
Capital Cost	$14 - $17 M	Conceptual-level capital costs are estimated at $14 - 17M, depending on finished water quality. Operational costs estimated at $2.6 M/year. Lifecycle costs are projected to be approximately $3.6 - $3.8 M/year. Unit costs are $1,100/AF.
Operating & Maintenance Cost	$2.6 M/Year	
Environmental Mitigation Cost	Included in Capital Cost	
Lifecycle Cost	$3.6 - $3.8 M	
Allocation of Costs	N/A	
Environmental Impacts[1]		
Overall Impacts to Environment[1]	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the concept facilities would primarily consist of temporary construction-related effects. Siting of facilities (e.g., groundwater wells) may result in direct effects to sensitive resources depending on the location. No long-term operational effects are expected if brine discharge complies with existing NPDES permit. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
Overall Benefits to Environment[1]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source (Santa Clara – Pico Power Plant Site only) to offset SCVWD during normal years reduces spring and summer pumping from the Delta, there would be a benefit to the Delta. Incremental benefits to the environment from implementation of the concept at the other sites are not expected. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential		
External Support	TBD[2] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[2] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
Internal Consistency with Agency Plans and Baselines	TBD[2] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	3	BAWSCA, SFPUC, SCVWD
Population Receiving Benefits	3,700,000 people	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. To be determined in future studies.

Concept: South Bay Desalination - Irrigation and Industrial Use

Table G8-1 - Environmental Score Card

Performance Measure/Objective	Concept Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources) and brine would be combined with WQCP effluent or power plant blow-down water (to allow for mixing and dilution prior to discharge). Construction of concept facilities (desal plant, wells, and pipeline) could result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual terrestrial effects cannot be defined or quantified. However, these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if other facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** As described above, the majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual biological effects cannot be defined or quantified. Other facilities would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may require replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special-status species to a large extent. Any effects to special-status species would likely be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Generally, energy requirements would be 3,250 kwh/mg of water (CDM, 2004). The energy demand of an individual desal facility is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

G9 South Bay Desalination – Potable Use

G9 South Bay Desalination – Potable Use

DESCRIPTION

The South Bay Desalination – Potable Uses concept would involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer for potable use. The upper aquifer is currently only used for small local domestic or agricultural purposes or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control Plant (WQCP) in Palo Alto. Each of the desalination plants is assumed to have a treated water production capacity of up to 4.3 million gallons per day (MGD)[1]. These concepts were evaluated in the regional desalination study (RDP PFR, 2003). The South Bay Desalination concepts were not carried forward in the detailed cost and operational analysis because of their small capacity. The detail included in this analysis has not been evaluated by the RDP. Additional analysis will be required to address potential environmental, institutional and other issues if this concept appears feasible.

South Bay Desalination – Potable Use Concept Summary

Extended Dry Year Supply	up to 12,900 AFY
Average Year Water Quality Supply	up to 8,300 AFY

Cost ($2005)

Capital Cost	$41 - $138 M
O&M Cost	$8.8-$9.5 M/Year
Unit Cost	$900-$1,400/AF

Potential Owning Agency
SCVWD

Potential Partners
SCVWD, SFPUC(1), BAWSCA

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

Potential participants are the Cities of Palo Alto, Santa Clara, and San Jose, which are SFPUC/SCVWD common customers. The total available dry-year supply for the concept is up to 13,800 AFY, based on three plants of 5 MGD intake capacity operating 95 percent of the time. A facility at the Palo Alto Regional WQCP could provide Palo Alto with up to 4,600 AFY of dry-year supply, freeing up SFPUC supply for delivery to other SFPUC wholesale or retail customers if the supply is not needed to meet demand in Palo Alto. A facility at the Pico Power Plant could potentially provide up to 4,600 AFY of dry-year supply for Santa Clara, freeing up either SCVWD or SFPUC water for delivery to other customers if the supply is not needed to meet demand in Santa Clara. A facility at Los Esteros Power Plant, located within the North San Jose/Alviso service area of the San Jose Municipal Water System (SJMWS) could potentially provide up to 4,600 AFY to offset use of groundwater or SFPUC purchases by SJMWS, increasing local groundwater dry-year yields, or freeing up water for delivery to other SFPUC wholesale or retail customers if the supply is not needed to meet demand in SJMWS. Water is assumed to be treated to match TDS levels of SCVWD or Hetch Hetchy surface water, depending on location.

Project Facilities for South Bay Desalination – Potable Uses Concept

Facility	Notes
Desalination Facilities • Groundwater wells • 5-MGD pipelines from wells to desalination plant • Pre- and post-treatment systems • 3.3-4.9-MGD reverse osmosis treatment • 0.7-1.0-MGD brine disposal via power plant cooling water return or Bay discharge	RO system with energy recovery, 14 milligrams per liter (mg/L) TDS RO water, 40-280 mg/L TDS for finished water after blending.
Pump Station • To be determined in future studies	
Pipelines **From Pico Power Plant to SCVWD system** • To be determined in future studies **From Pico Power Plant to City of Santa Clara system** • To be determined in future studies	
From Los Esteros Plant to SJMWS system • To be determined in future studies	

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[1] Plant capacity assumed to be 5 MGD. Treating influent brine at an 80% recovery ratio and blending to target TDS range of 40-280 mg/L.

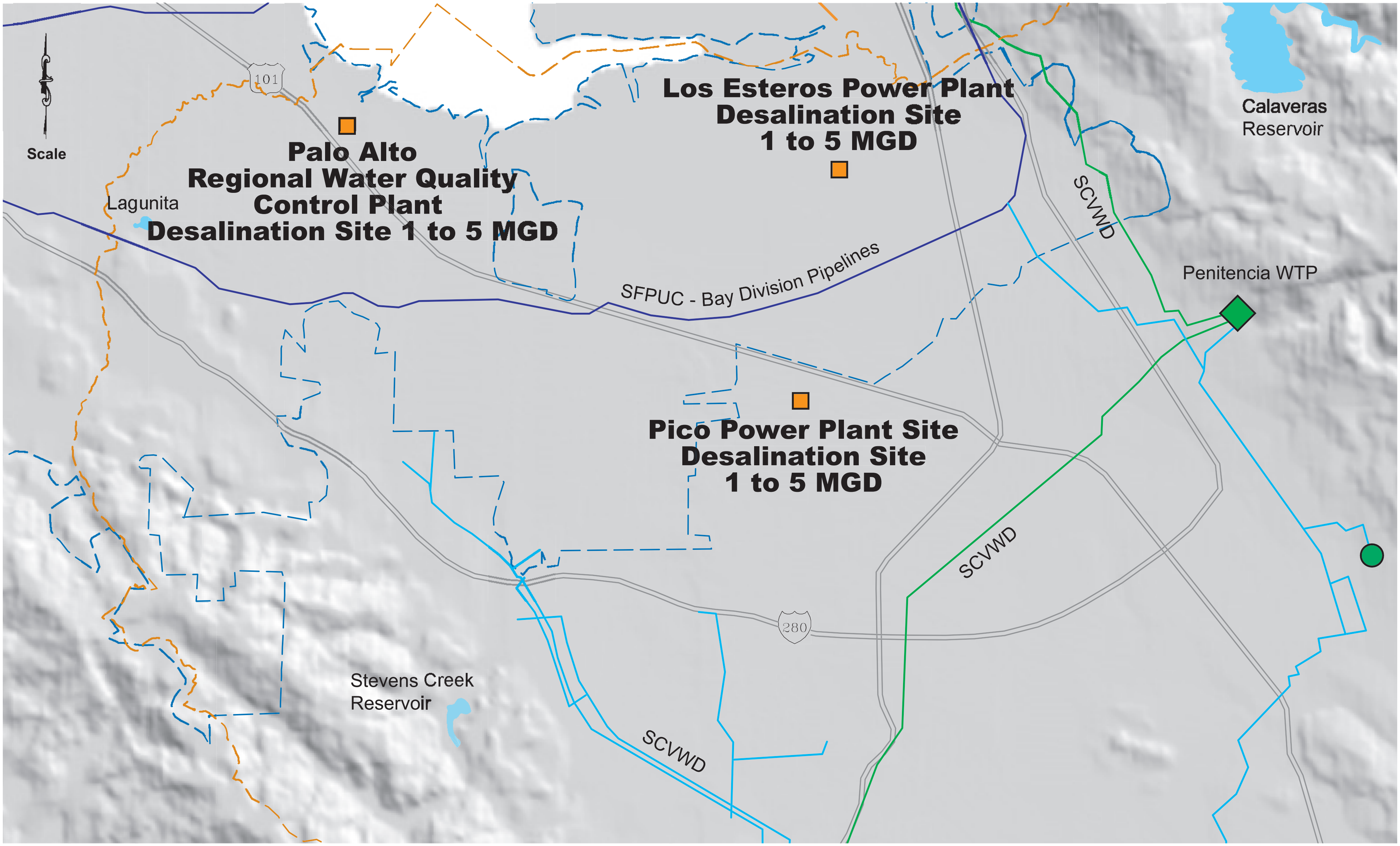

Figure G9-1
South Bay Desalination Potential Site Locations

CDM

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Concept: South Bay Desalination - Potable Use

Table G9-1 - Supply Reliability Score Card

Performance	Agency Baseline		South Bay Desalination - Potable Use Concept		Agency Baseline Plus South Bay Desalination - Potable Use Concept		
Measure/Objective	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	Notes/Other
Meet Demands	Compares supply from concept with baseline supply						
Critical Drought							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	BAWSCA, SFPUC, and SCVWD are all listed as beneficiaries. Projected desalinated supplies have not been partitioned as part of this project. Recipients include the City of Palo Alto, the City of Santa Clara, and the San Jose Municipal System.
BAWSCA Agencies' Supply	137,800	AFY	Up to 13,800	AFY	Up to 151,600	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	39,400	AFY	Up to 13,800	AFY	Up to 53,200	AFY	
SFPUC Supply	157,000	AFY	Up to 13,800	AFY	Up to 170,800	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[1]	196,400	AFY	Up to 13,800	AFY	Up to 210,200	AFY	
Extended Drought							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 13,800	AFY	Up to 223,700	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	63,000	AFY	Up to 13,800	AFY	Up to 76,800	AFY	
SFPUC Supply	255,000	AFY	Up to 13,800	AFY	Up to 268,800	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[1]	318,000	AFY	Up to 13,800	AFY	Up to 331,800	AFY	
Average Year							
ACWD Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 8,300	AFY	345,000	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)	97,800	AFY	Up to 8,300	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	0	AFY	329,000	AFY	
Zone 7 Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[1]	426,800	AFY	Up to 8,300	AFY	426,800	AFY	
Vulnerability	1 to 5 score. 1 = high vulnerability to catastrophic events; 5 = low vulnerability to catastrophic events.						
ACWD	N/A		N/A				
BAWSCA Agencies	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - Could provide small supply source in the event of a supply disruption.				
CCWD	N/A		N/A				
EBMUD	N/A		N/A				
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply, but only a small fraction of SCVWD customers could be served.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		Reduces Vulnerability - Could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption on the Hetch Hetchy Aqueduct, but only a small fraction of SFPUC customers could be served.				
Zone 7			N/A				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - Project would be locally controlled.							

1. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Concept: South Bay Desalination - Potable Use

Table G9-2 - Public Health Protection Scorecard[1]

Concept: South Bay Desalination - Potable Use

Performance Measure/Objective	Concept		Baseline Plus Concept		Notes
	South Bay Desalination - Potable Use Source Water	South Bay Desalination - Potable Use Treated Water	South Bay Desalination - Potable Use Source Water	South Bay Desalination - Potable Use Treated Water	
Variability for Treatment					
ACWD					
BAWSCA Agencies	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
CCWD					
EBMUD					
SCVWD	NA	NA	NA	NA	
SFPUC	NA	NA	NA	NA	
Zone 7					
Total Dissolved Solids					
ACWD					
BAWSCA Agencies	NA	No Effect on TDS	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS.
CCWD					
EBMUD					
SCVWD	NA	No Effect on TDS	NA	NA	
SFPUC	NA	No Effect on TDS	NA	NA	
Zone 7					
Disinfection By-Products					
ACWD					
BAWSCA Agencies	NA	Reduces DBPs	NA	NA	Desalinated supplies for potable use will be significantly lower in DBP than usual supplies, due to lower chlorine demand.
CCWD					
EBMUD					
SCVWD	NA	Reduces DBPs	NA	NA	
SFPUC	NA	Reduces DBPs	NA	NA	
Zone 7					
Taste and Odor Problems (Excluding TDS)					
ACWD					
BAWSCA Agencies	NA	No Effect on T&O	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Desalinated supplies will have significantly lower TOC than usual supplies, but higher chloride than Hetch Hetchy.
CCWD					
EBMUD					
SCVWD	NA	No Effect on T&O	NA	NA	
SFPUC	NA	No Effect on T&O	NA	NA	
Zone 7					
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD					
BAWSCA Agencies	NA	No Effect on Potential for Degradation	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Bromide levels will be well below SCVWD averages, and a significant reduction in TOC is expected. No water quality degradation is projected.
CCWD					
EBMUD					
SCVWD	NA	No Effect on Potential for Degradation	NA	NA	
SFPUC	NA	No Effect on Potential for Degradation	NA	NA	
Zone 7					
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD					
BAWSCA Agencies	NA	No Effect on Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
CCWD					
EBMUD					
SCVWD	NA	No Effect on Potential for Degradation	NA	NA	
SFPUC	NA	No Effect on Potential for Degradation	NA	NA	
Zone 7					

1. Two TDS targets were evaluated, 40 mg/L and 280 mg/L.

Concept: South Bay Desalination - Potable Use

Table G9-2a - Public Health Protection Score Card by Agency [1]

Agency: SCVWD

			Agency Baseline		Concept		Baseline Plus Concept		
Performance Measure/Objective	Metric or Qual	Units	SCVWD Source Water (SWP)	SCVWD Treated Water (SWP)	South Bay Desalination - Potable Use Source Water	South Bay Desalination - Potable Use Treated Water	Agency Baseline Plus South Bay Desalination - Potable Use Source Water	Agency Baseline Plus South Bay Desalination - Potable Use Treated Water	Notes
Supply Quantity									
Critical Year		AFY	39,400		13,800		53,200		
Extended Dry Year		AFY	63,000		13,800		76,800		
Average Year		AFY	97,800		8,300		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.37	0.33	NA	0.08	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	5.1	3.9	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.26	0.24	NA	0.08	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	3.7	2.7	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.19	0.17	NA	0.08	NA	NA	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	4.0	3.0	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	40 - 280	NA	NA	
	Mean	mg/L	507	527	NA	160	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	40 - 280	NA	NA	
	Mean	mg/L	384	404	NA	160	NA	NA	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	40 - 280	NA	NA	
	Mean	mg/L	296	316	NA	160	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	ND	NA	NA	
	Mean	mg/L	NA	6	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	27 - 44	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	34	NA	1	NA	NA	
HAA5	Range	mg/L	NA	11 - 14	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	13	NA	2	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	ND	NA	NA	
	Mean	mg/L	NA	4	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	16 - 40	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	27	NA	1	NA	NA	
HAA5	Range	mg/L	NA	7 - 18	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	11	NA	2	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	ND	NA	NA	
	Mean	mg/L	NA	3	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	22 - 34	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	27	NA	1	NA	NA	
HAA5	Range	mg/L	NA	9 - 15	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	12	NA	2	NA	NA	
Minimize Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	

1. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Concept: South Bay Desalination - Potable Use

Table G9-2b - Public Health Protection Score Card by Agency [1]

Agency: SFPUC

			Agency Baseline		Concept		Baseline Plus Concept		
Performance Measure/Objective	Metric or Qual	Units	SFPUC Source Water	SFPUC Treated Water	South Bay Desalination - Potable Use Source Water	South Bay Desalination - Potable Use Treated Water	Agency Baseline South Bay Desalination - Potable Use Source Water	Agency Baseline South Bay Desalination - Potable Use Treated Water	Notes
Supply Quantity									
Critical Year		AFY	157,000		13,800		170,800		
Extended Dry Year		AFY	255,000		13,800		268,800		
Average Year		AFY	329,000		0		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.08	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.08	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.01	0.01	NA	0.08	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	1.7	1.6	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40 - 280	NA	NA	
	Mean	mg/L	26	26	NA	160	NA	NA	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40 - 280	NA	NA	
	Mean	mg/L	42	42	NA	160	NA	NA	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40 - 280	NA	NA	
	Mean	mg/L	40	40	NA	160	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	34 - 47	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	38	NA	1	NA	NA	
HAA5	Range	mg/L	NA	28 - 40	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	32	NA	2	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	33 - 50	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	38	NA	1	NA	NA	
HAA5	Range	mg/L	NA	24 - 44	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	30	NA	2	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	24 - 43	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	33	NA	1	NA	NA	
HAA5	Range	mg/L	NA	22 - 34	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	28	NA	2	NA	NA	
Minimize Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Concept: South Bay Desalination - Potable Use

Table G9-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	Concept Amount or Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	$41 - $138 M	Conceptual-level capital costs are estimated at $41 - 138M, depending on finished water quality. Operational costs estimated at $8.8 - $9.5 M/year. Lifecycle costs are projected to be approximately $12.4 - $18.8 M/year. Unit costs are $860 - $1,390/AF
Operating & Maintenance Cost	$8.8 - $9.5 M/Yr	
Environmental Mitigation Cost	Included in capital cost	
Lifecycle Cost	$12.4 - $18.8 M/Yr	
Allocation of Costs	N/A	
Environmental Impacts[1]		
Overall Impacts to Environment[1]	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the concept facilities would primarily consist of temporary construction-related effects. Siting of facilities (e.g., groundwater wells) may result in direct effects to sensitive resources depending on the location. No long-term operational effects are expected if brine discharge complies with existing NPDES permit. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
Overall Benefits to Environment[1]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source (Santa Clara – Pico Power Plant Site only) to offset SCVWD during normal years reduces spring and summer pumping from the Delta, there would be a benefit to the Delta. Incremental benefits to the environment from implementation of the concept at the other sites are not expected. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential		
External Support	TBD[2] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[2] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
Internal Consistency with Agency Plans and Baselines	TBD[2] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	3	BAWSCA, SFPUC, SCVWD
Population Receiving Benefits	3,700,000 people	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. To be determined in future studies.

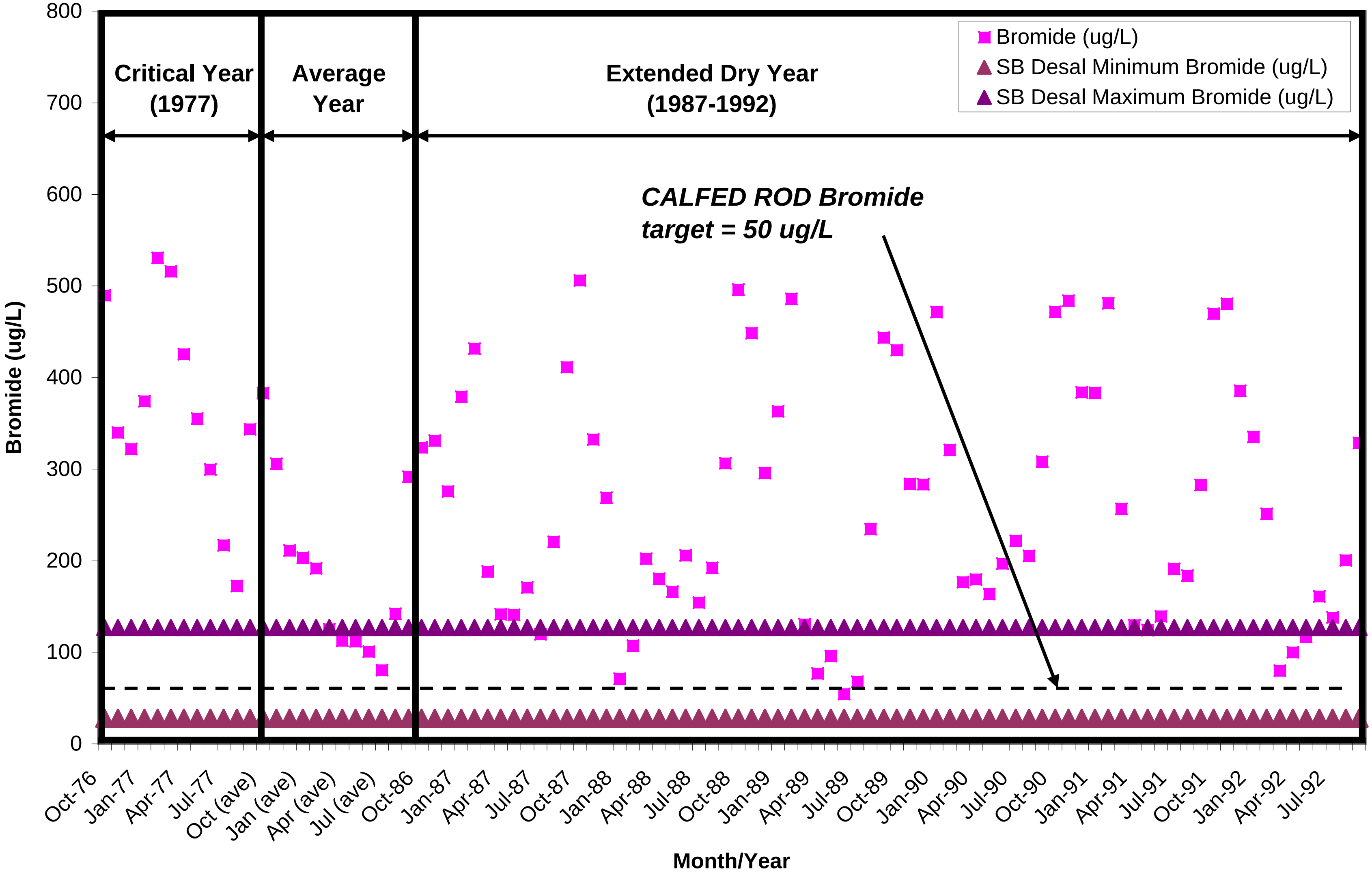
Concept: South Bay Desalination - Potable Use

Table G9-4 - Environmental Score Card

Performance Measure/Objective	Concept Score	Notes/Other
Aquatic Environment		
Potential Impacts to Aquatic Environment		**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources) and brine would be combined with WQCP effluent or power plant blow-down water (to allow for mixing and dilution prior to discharge). Construction of concept facilities (desal plant, wells, and pipeline) could result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)		**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual terrestrial effects cannot be defined or quantified. However, these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if other facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
Wetlands		
Potential Impacts to Wetland Resources (acreage affected)		**Effects on Wetlands (Before Mitigation): Impacts.** As described above, the majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual biological effects cannot be defined or quantified. Other facilities would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may require replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)		**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special-status species to a large extent. Any effects to special-status species would likely be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
Energy Consumption		
Potential Increases in Energy Consumption (amount of energy required for facility operation)		**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Generally, energy requirements would be 3,250 kwh/mg of water (CDM, 2004). The energy demand of an individual desal facility is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production		

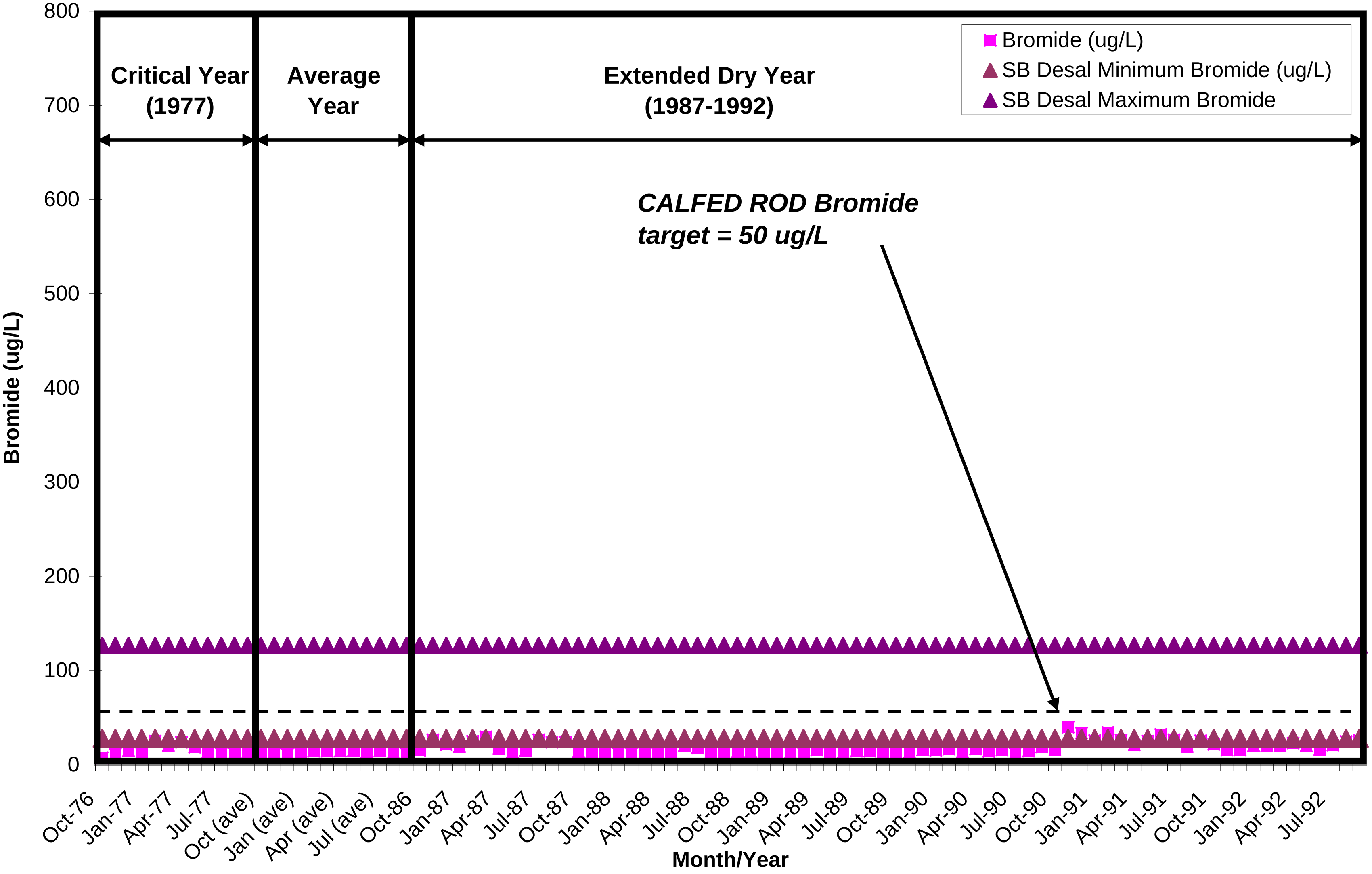
Concept: South Bay Desalination - Potable Use

Comparison of SCVWD Baseline Source Water Bromide with South Bay Desalination Concept Bromide



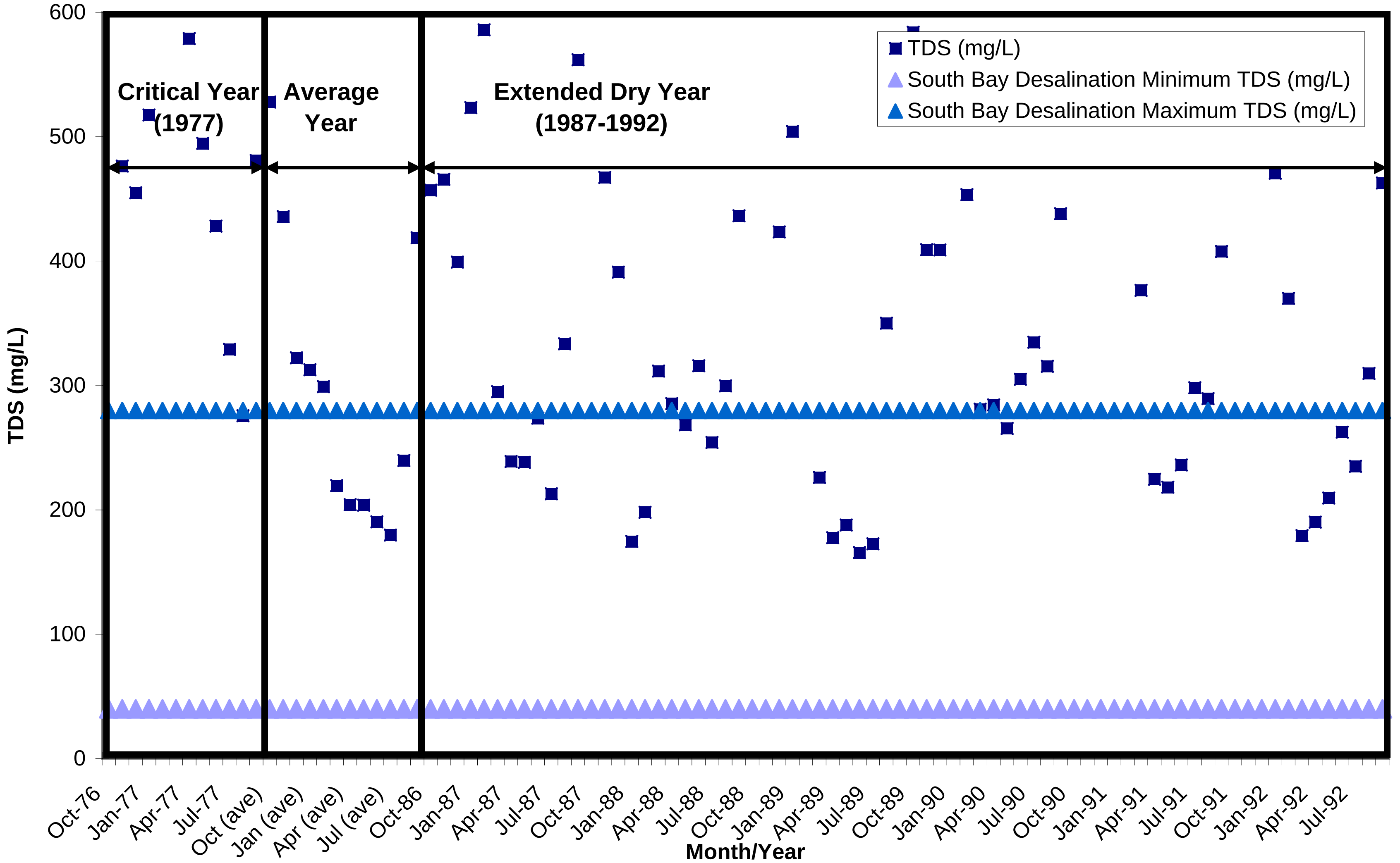
Concept: South Bay Desalination - Potable Use

Comparison of SFPUC Baseline Source Water Bromide with South Bay Desalination Concept Bromide



Concept: South Bay Desalination - Potable Use

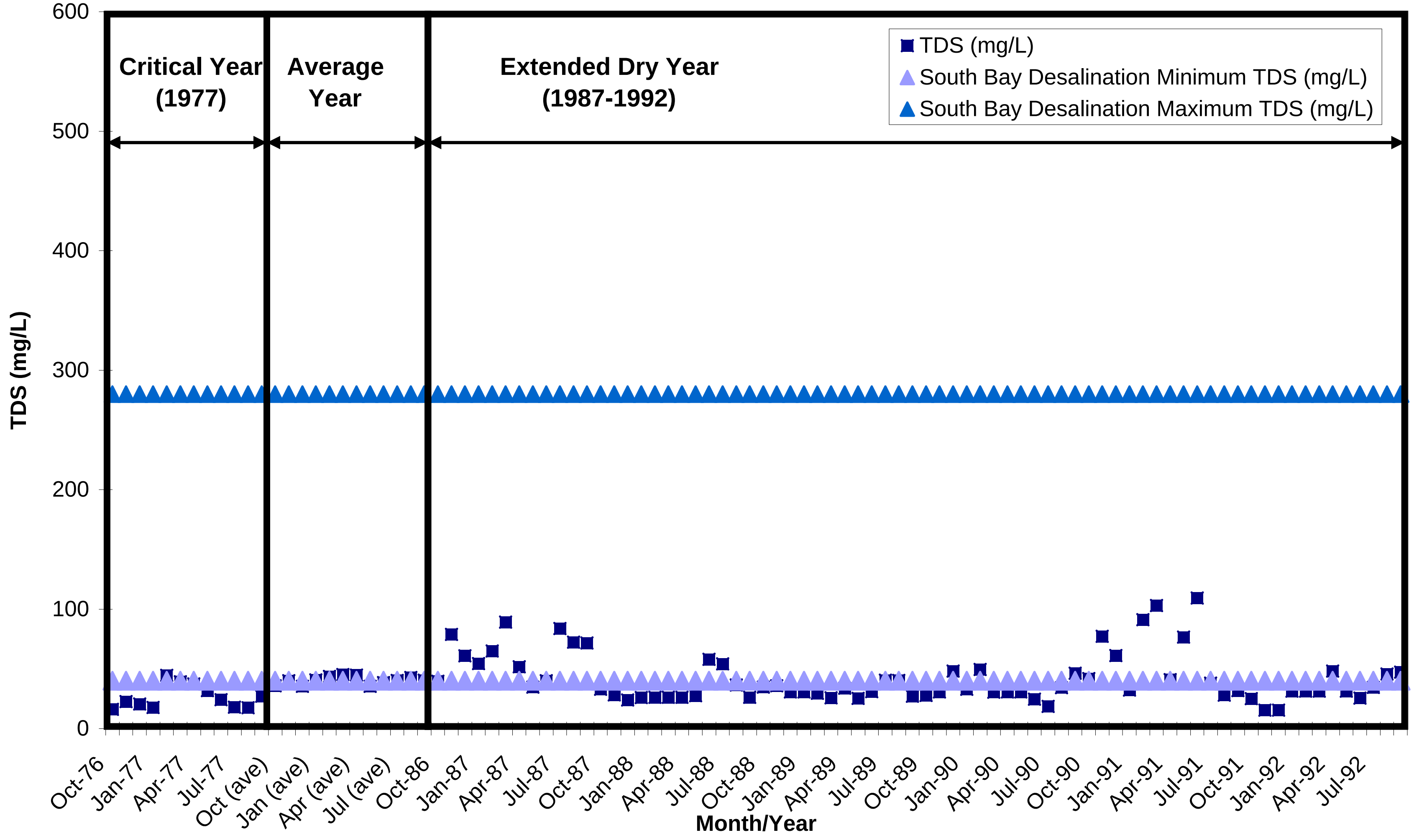
Comparison of SCVWD Baseline Source Water TDS with South Bay Desalination Concept TDS



Note: TDS based on permeate (single pass) TDS of 45 mg/L. Permeate blended to a minimum TDS target of 100 mg/L and maximum target 280

Concept: South Bay Desalination - Potable Use

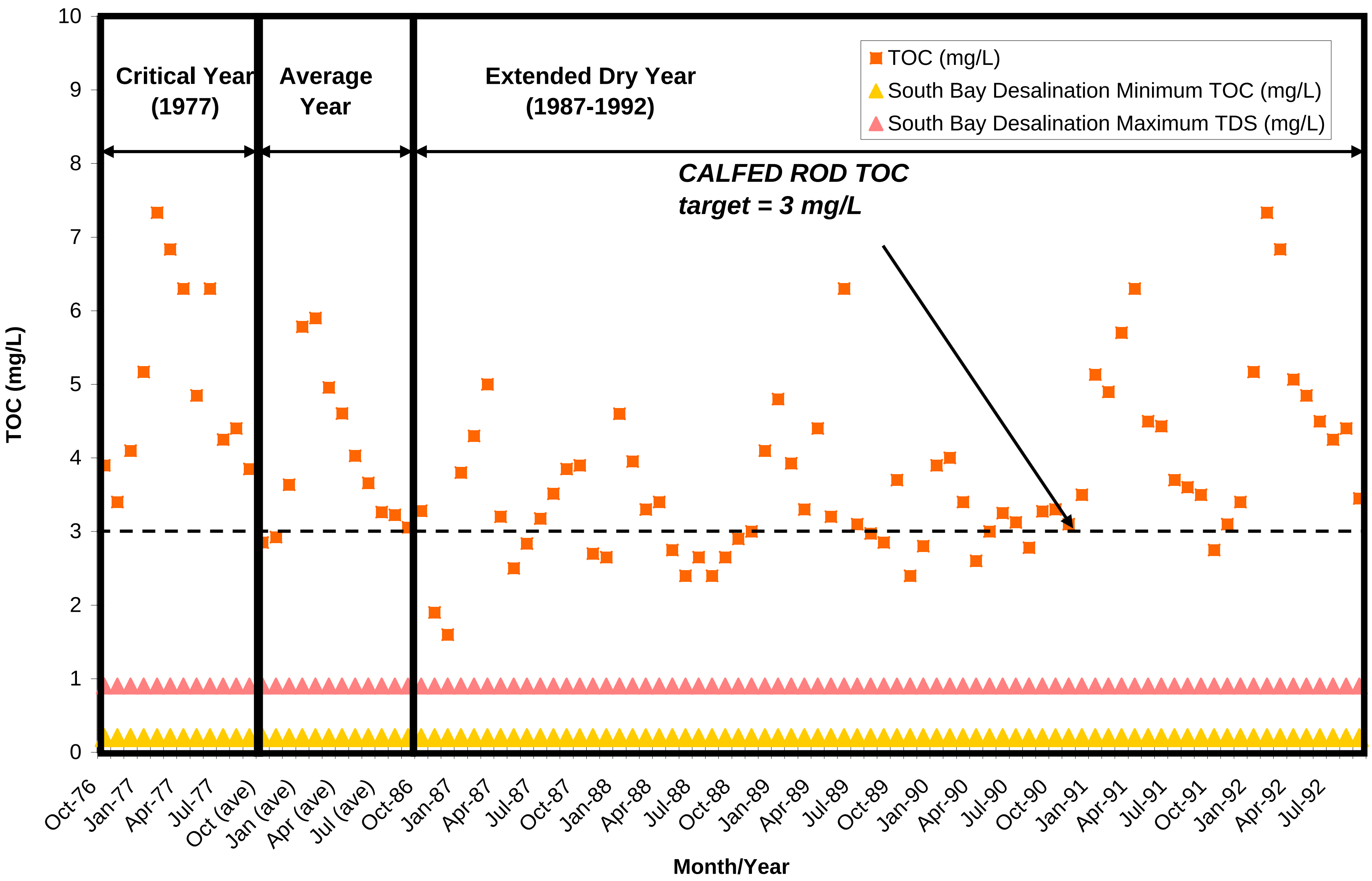
Comparison of SFPUC Baseline Source Water TDS with South Bay Desalination Concept TDS



Note: TDS based on permeate (single pass) TDS of 45 mg/L. Permeate blended to a minimum TDS target of 100 mg/L and maximum target 280

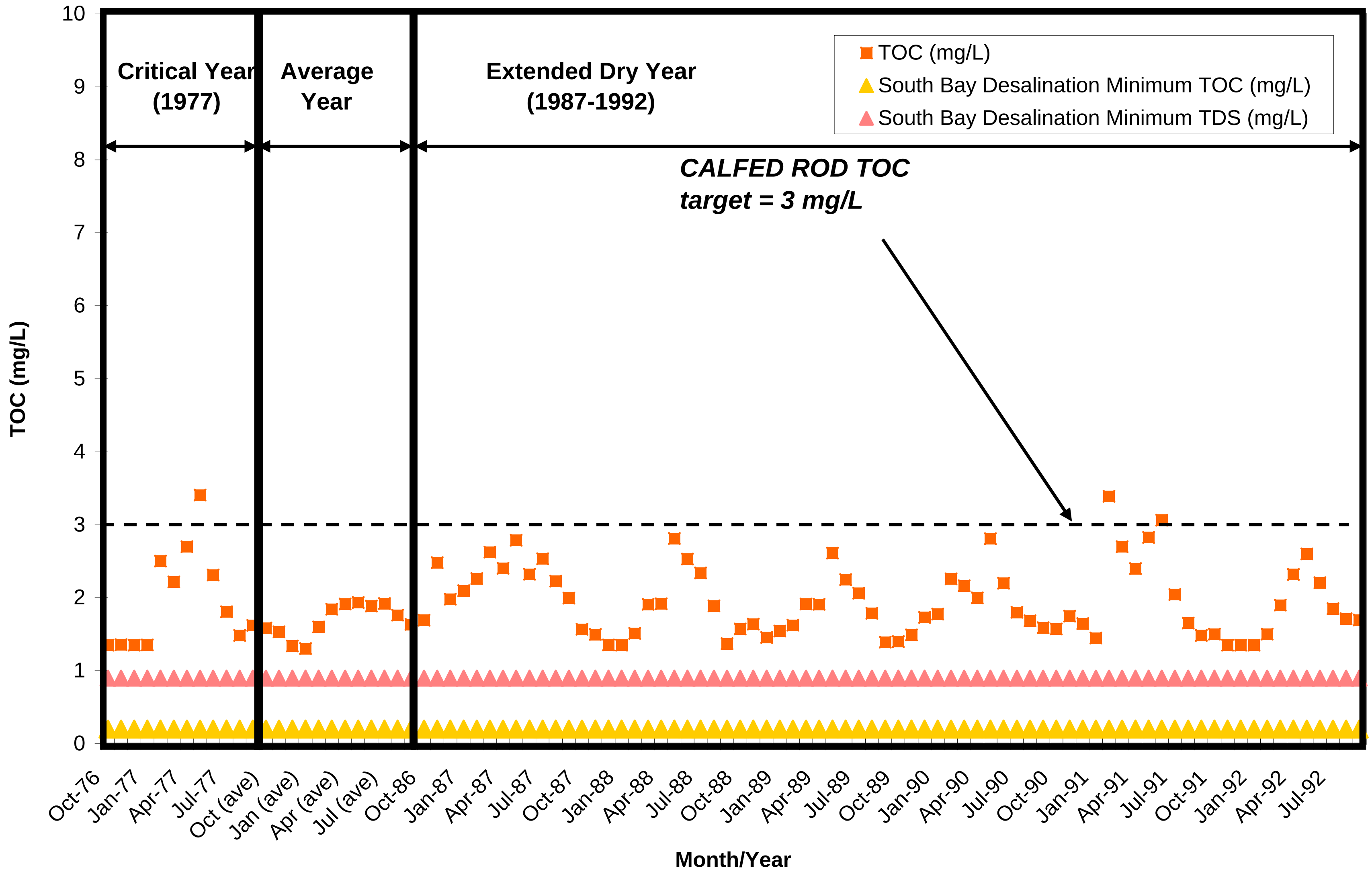
Concept: South Bay Desalination - Potable Use

Comparison of SCVWD Baseline Source Water TOC with South Bay Desalination TOC



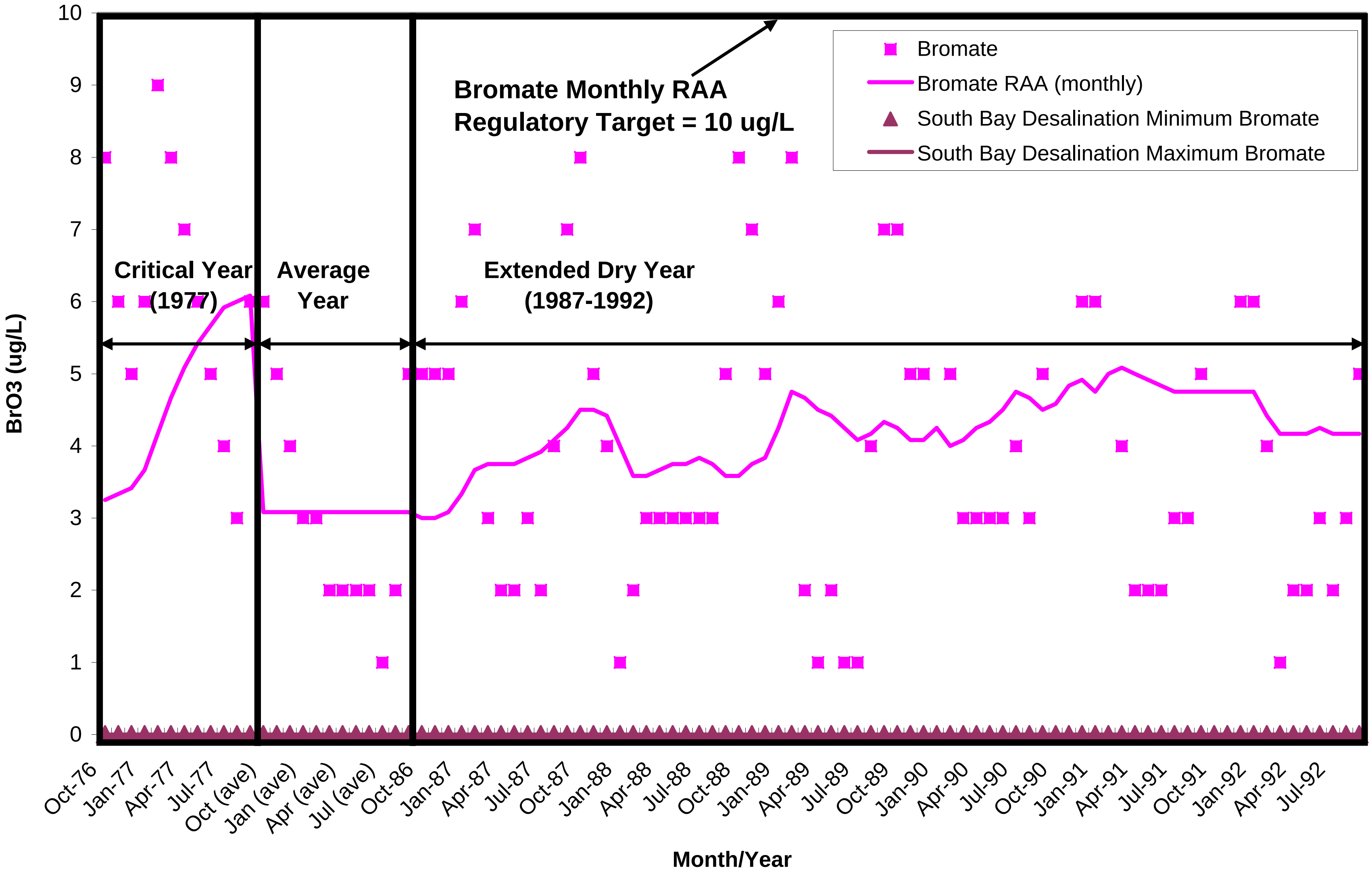
Concept: South Bay Desalination - Potable Use

Comparison of SFPUC Baseline Source Water TOC with South Bay Desalination TOC



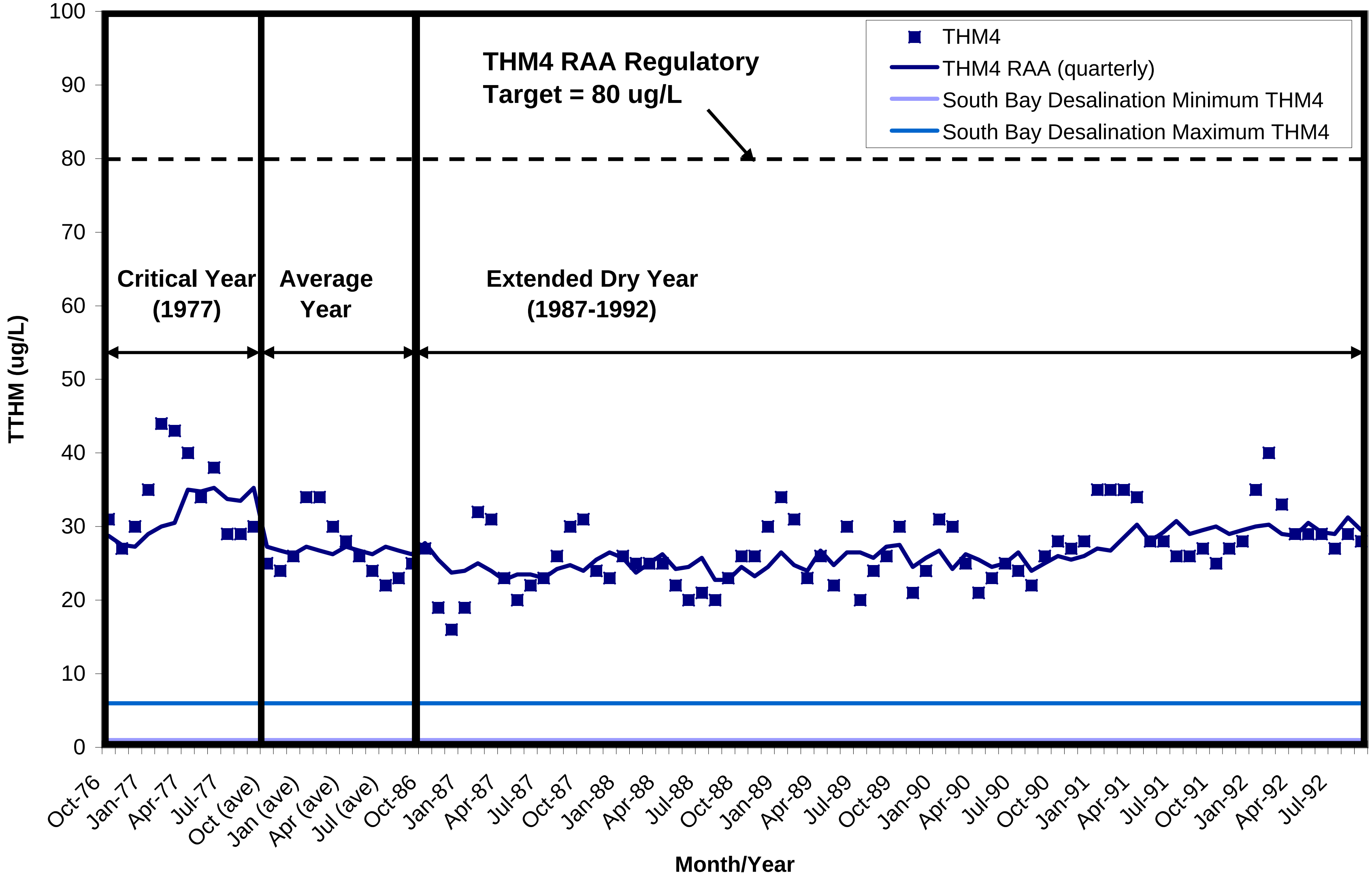
Concept: South Bay Desalination - Potable Use

Comparison of SCVWD Baseline Bromate with South Bay Desalination Bromate



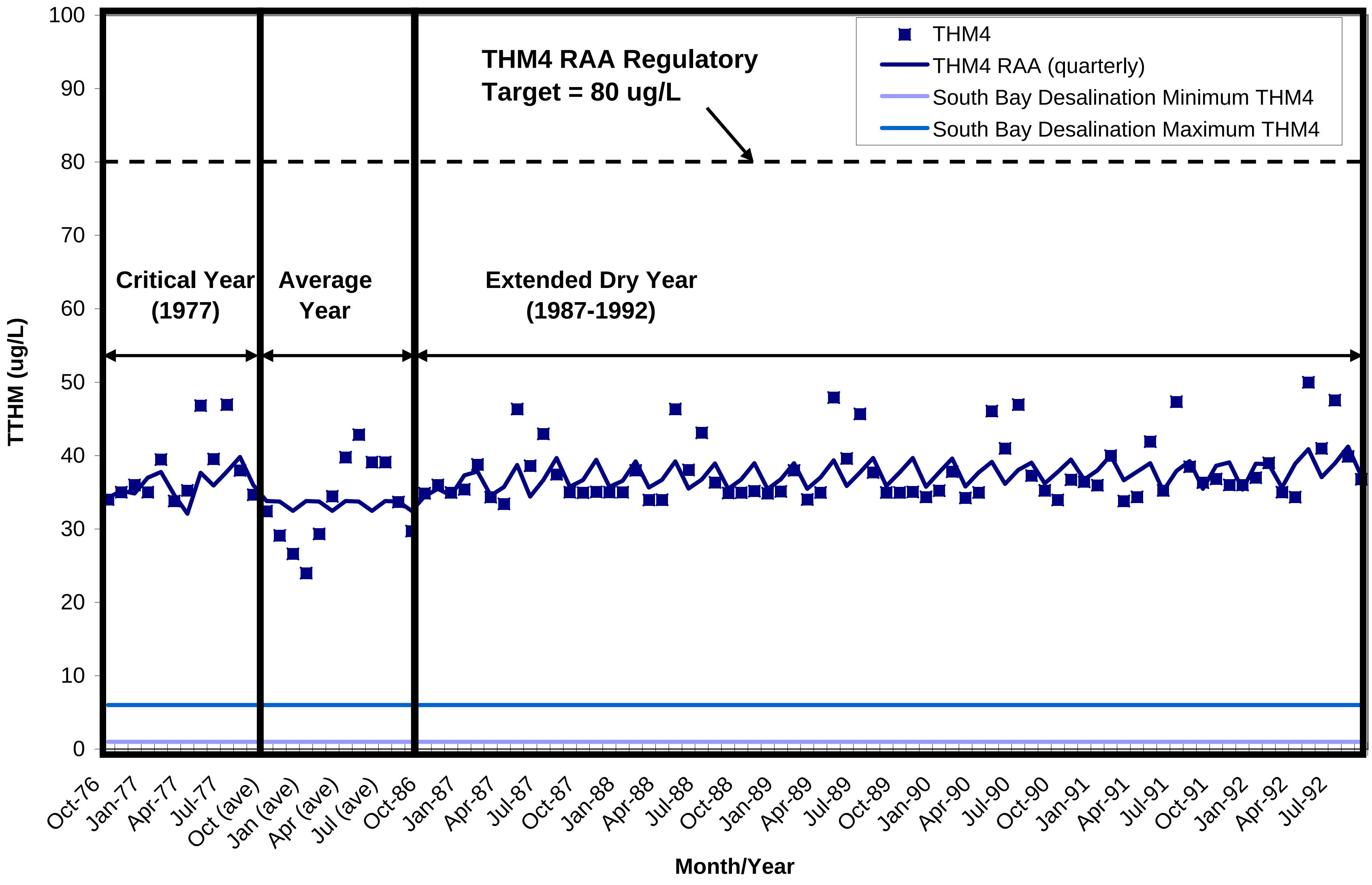
Concept: South Bay Desalination - Potable Use

Comparison of SCVWD Baseline THM4 with South Bay Desalination THM4

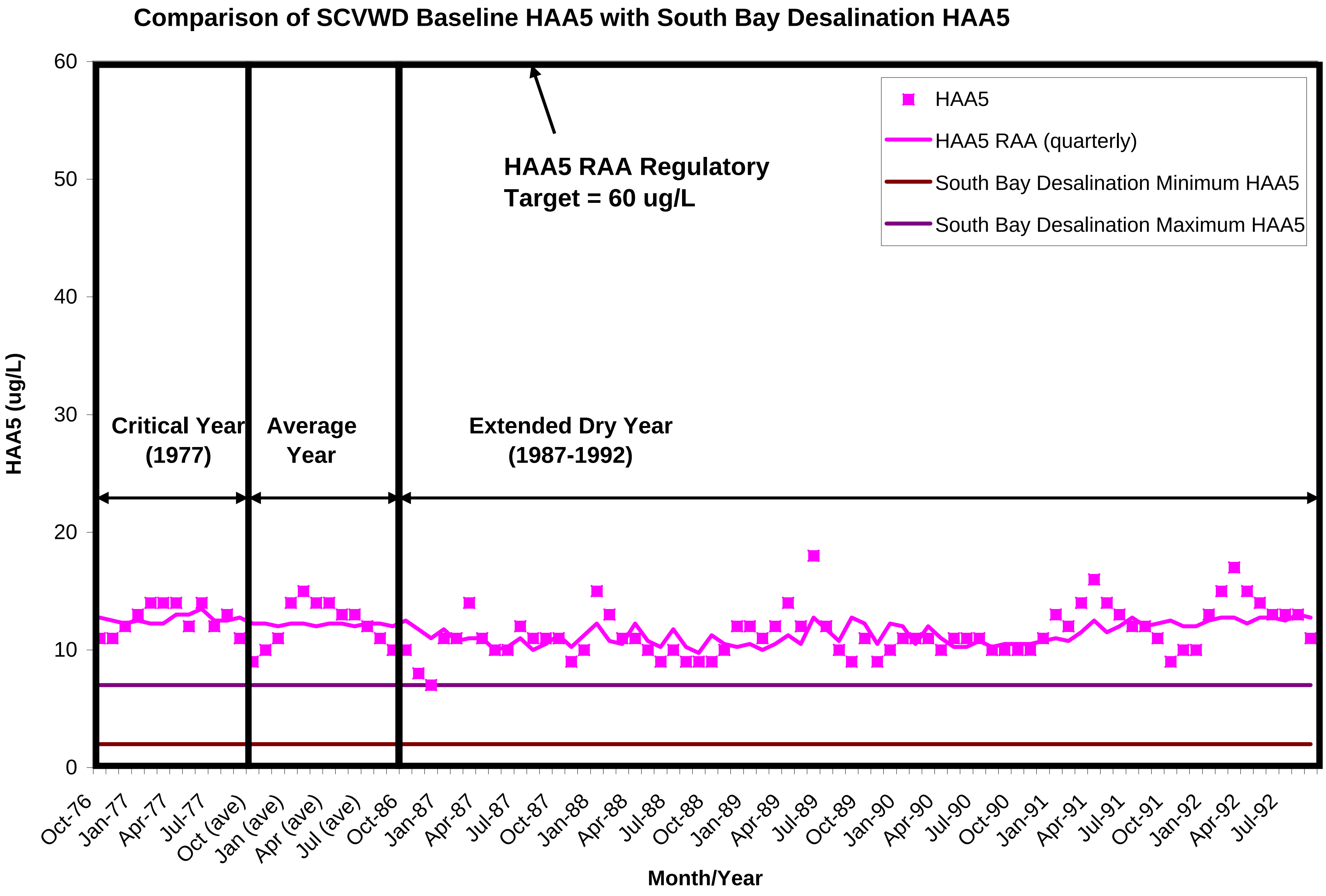


Concept: South Bay Desalination - Potable Use

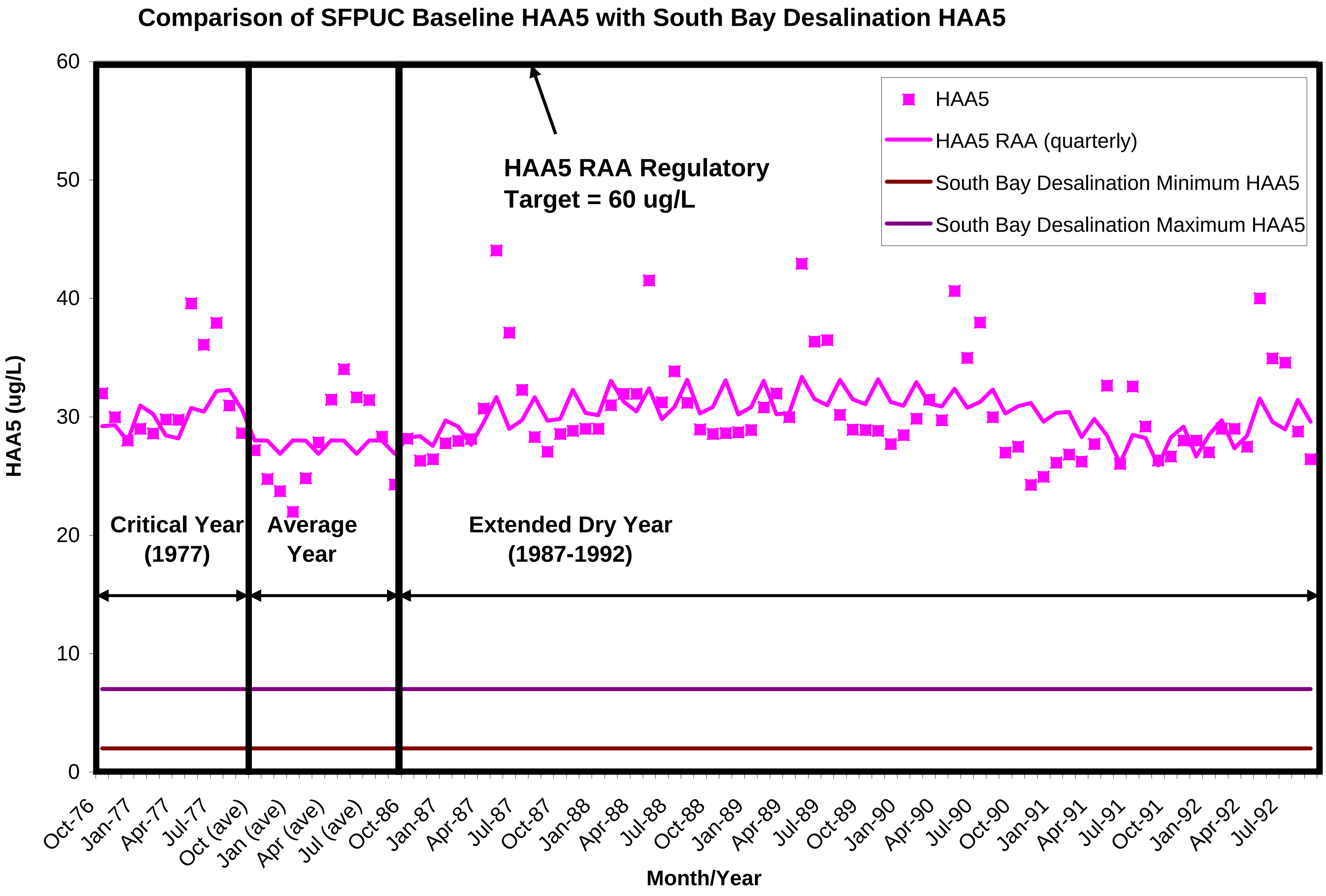
Comparison of SFPUC Baseline THM4 with South Bay Desalination THM4



Concept: South Bay Desalination - Potable Use



Concept: South Bay Desalination - Potable Use



G10 East Bay Saline GW Desalination

G10 East Bay Saline Groundwater Desalination

DESCRIPTION

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the Newark Aquifer (underlying the San Francisco Bay). Water would be extracted through a series of bay shore perimeter wells within ACWD's service district area. Finished water will be pumped directly into ACWD's distribution system and/or into the Bay Division pipeline of San Francisco's Hetch Hetchy system. Alternatives for concentrate discharge include disposal to the East Bay Discharge Authority (EBDA) discharge line. Additional analysis will be required to address potential environmental, water rights, institutional and other issues if this concept appears feasible.

Potential participants are ACWD, BAWSCA, SCVWD (details to be developed in future studies), and SFPUC. The total available dry-year supply for the concept is up to 16,000 AFY, assuming a 95 percent plant factor.

East Bay Saline Groundwater Desalination Concept Summary

Extended Dry Year Supply	up to 16,000 AFY
Average Year Water Quality Supply	up to 16,000 AFY

Cost ($2005)

Capital Cost	To be determined in future studies
O&M Cost	To be determined in future studies
Unit Cost	To be determined in future studies

Potential Owning Agency
ACWD

Potential Partners
ACWD, BAWSCA, SFPUC[1], SCVWD (details to be determined in future studies)

[1] For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

Project Facilities for East Bay Saline Groundwater Desalination Concept

Facility	Notes
Desalination Facility	
• Bayshore wells	Wells in saline portion of Newark Aquifer.
• Raw water pipeline to desalination plant	
• Reverse osmosis treatment plant (Up to 15 MGD product water)	ACWD estimates 10 to 15 MGD capacity
• Brine disposal pipeline	Possible connection to EBDA transmission system.
• Connection to existing power transmission	Potential for use of Hetch Hetchy power
Conveyance Facilities	
• Treated Water Pump Station	
• Connection to BDPL1&2 or ACWD system	

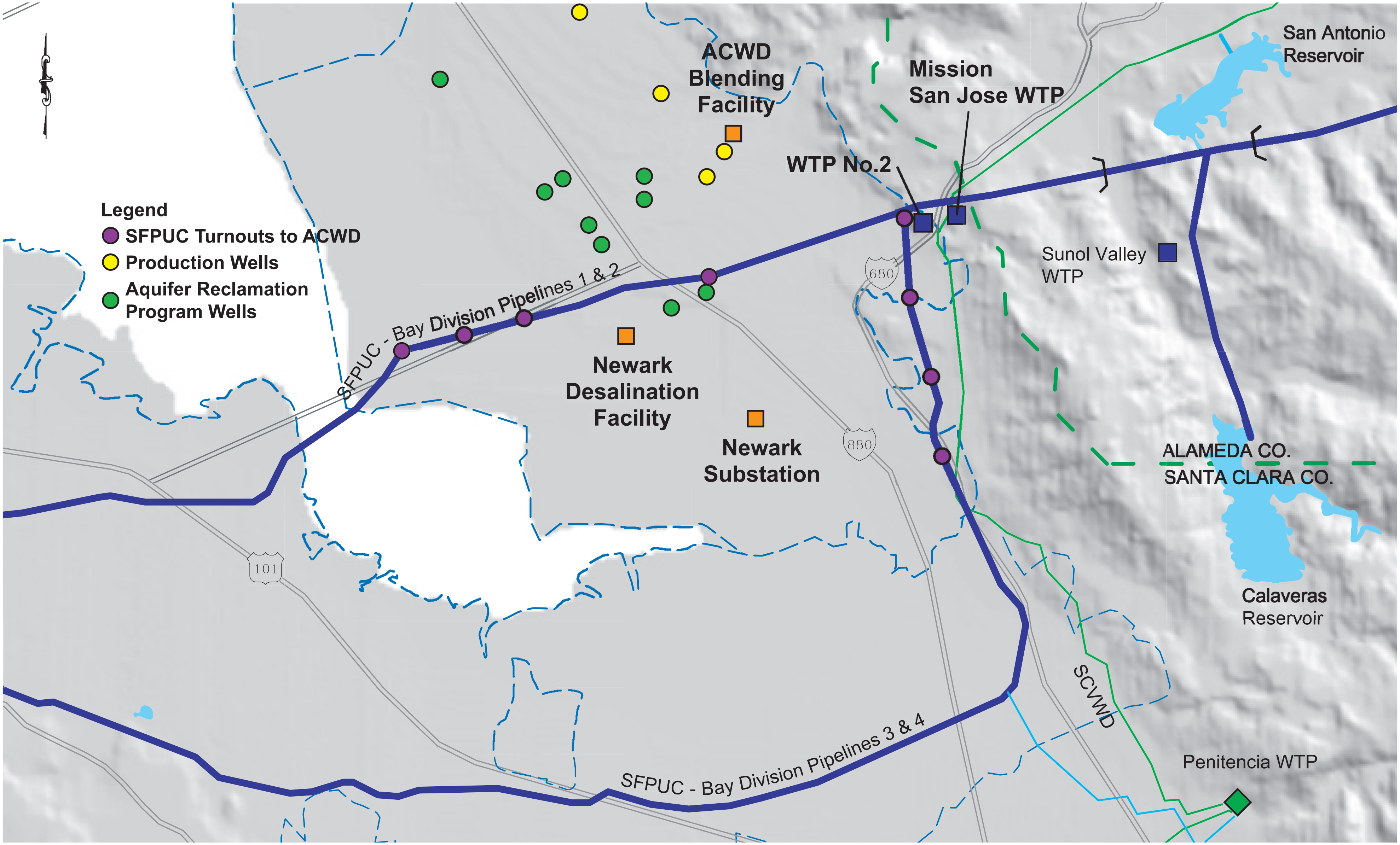


Figure G10-1
East Bay Saline Groundwater Desalination - General Area Map

CDM

W:\REPORTS\ABAG\Bay Area WQ&WSRP\Final Report Mar 2005\Graphics\Appendix G\Desalination\East Bay Saline GW Desal - Gen Area Map (FigG10-1).ai 03/02/05

Concept: East Bay Saline Groundwater Desalination

Table G10-1 - Supply Reliability Score Card

Performance Measure/Objective	Agency Baseline Amount or Description	Agency Baseline Units	East Bay Saline Groundwater Desalination Concept Amount or Description	East Bay Saline Groundwater Desalination Concept Units	Agency Baseline Plus East Bay Saline Groundwater Desalination Concept Amount or Description	Agency Baseline Plus East Bay Saline Groundwater Desalination Concept Units	Notes/Other
Meet Demands	Compares supply from concept with baseline supply						
Critical Drought							Water would be extracted through a series of bay shore perimeter wells within ACWD's service district area. Finished water will be pumped directly into ACWD's distribution system and/or into the Bay Division pipeline of San Francisco's Hetch Hetchy system. Alternatives for concentrate discharge include disposal to the East Bay Discharge Authority (EBDA) discharge line. Details of SCVWD participation to be developed in future studies.
ACWD Supply (SWP)	20,600	AFY	Up to 16,000	AFY	Up to 36,600	AFY	
BAWSCA Agencies' Supply	137,800	AFY	Up to 16,000	AFY	Up to 153,800	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)[1]	39,400	AFY	Up to 16,000	AFY	Up to 55,400	AFY	
SFPUC Supply	157,000	AFY	Up to 16,000	AFY	Up to 173,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[2]	217,000	AFY	Up to 16,000	AFY	Up to 233,000	AFY	
Extended Drought							
ACWD Supply (SWP)	25,500	AFY	Up to 16,000	AFY	Up to 41,500	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 16,000	AFY	Up to 225,900	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)[1]	63,000	AFY	Up to 16,000	AFY	Up to 79,000	AFY	
SFPUC Supply	255,000	AFY	Up to 16,000	AFY	Up to 271,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[2]	343,500	AFY	Up to 16,000	AFY	Up to 359,500	AFY	
Average Year							
ACWD Supply (SWP)	42,700	AFY	Up to 16,000	AFY	42,700	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 16,000	AFY	345,000	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SCVWD Supply (SWP)[1]	97,800	AFY	Up to 16,000	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	0	AFY	329,000	AFY	
Zone 7 Supply (SWP)	N/A	AFY	N/A	AFY	N/A	AFY	
Total Supply[2]	469,500	AFY	Up to 16,000	AFY	469,500	AFY	
Vulnerability							
ACWD	Delta supply sources susceptible to liquefaction of Delta levees. SFPUC sources require extensive transmission, susceptible to catastrophes including earthquakes.		Reduces Vulnerability - Provides separate connection point to ACWD if South Bay Aqueduct or SFPUC supply were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
BAWSCA Agencies	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - Provides alternate source of supply if Irvington Tunnel were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
CCWD	N/A		N/A				
EBMUD	N/A		N/A				
SCVWD[1]	Delta supply sources susceptible to liquefaction of Delta levees.		TBD[1]				
SFPUC	Extensive transmission required to convey Hetch Hetchy and Sunol water to SFPUC retail system, susceptible to catastrophes including earthquakes.		Reduces Vulnerability - Provides alternate source of supply if Irvington Tunnel were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
Zone 7	N/A		N/A				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - Project would be locally controlled.							

1. Details of SCVWD participation to be determined in future studies. Effect on vulnerability will depend upon operation.

2. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Concept: East Bay Saline Groundwater Desalination

Table G10-2 - Public Health Protection Scorecard

Concept: East Bay Saline Groundwater Desalination[1]

Performance Measure/Objective	Concept		Baseline Plus Concept		Notes
	East Bay Saline Groundwater Desal Source Water	East Bay Saline Groundwater Desal Treated Water	Agency Baseline Plus East Bay Saline Groundwater Desal Source Water	Agency Baseline Plus East Bay Saline Groundwater Desal Treated Water	
Variability for Treatment					
ACWD	NA	NA	NA	NA	No effect on untreated water quality of current plants
BAWSCA Agencies	NA	NA	NA	NA	
CCWD					
EBMUD					
SCVWD[2]	NA	NA	NA	NA	
SFPUC	NA	NA	NA	NA	
Zone 7					
Total Dissolved Solids					
ACWD	Reduces TDS	Reduces TDS	NA	NA	Reduced TDS for customers receiving East Bay Saline Groundwater Desalinated water
BAWSCA Agencies	Reduces TDS	Reduces TDS	NA	NA	Overall reduction in TDS for customers receiving East Bay Saline Groundwater Desalinated water (no change as compared with SFPUC supply, reduction as compared with SWP supply).
CCWD					
EBMUD					
SCVWD[2]	Reduces TDS	Reduces TDS	NA	NA	Reduced TDS for customers receiving East Bay Saline Groundwater Desalinated water
SFPUC	Increases TDS	Increases TDS	NA	NA	Minimal increase in TDS[1]
Zone 7					
Disinfection By-Products					
ACWD	Reduces DBPs	Reduces DBPs	NA	NA	Improved overall quality
BAWSCA Agencies	Reduces DBPs	Reduces DBPs	NA	NA	Improved overall quality
CCWD					
EBMUD					
SCVWD[2]	Reduces DBPs	Reduces DBPs	NA	NA	Improved overall quality
SFPUC	Reduces DBPs	Reduces DBPs	NA	NA	Desalinated DBPs lower than baseline
Zone 7					
Taste and Odor Problems (Excluding TDS)					
ACWD	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
BAWSCA Agencies	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
CCWD					
EBMUD					
SCVWD[2]	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
SFPUC	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
Zone 7					
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	NA	NA	Reduces Potential for Degradation	NA	East Bay Saline Groundwater Desalination treated water quality is comparable to SFPUC water quality (improved quality compared to SBA source).
BAWSCA Agencies	NA	NA	Reduces Potential for Degradation	NA	
CCWD					
EBMUD					
SCVWD[2]	NA	NA	Reduces Potential for Degradation	NA	
SFPUC	NA	NA	No Effect on Potential for Degradation	NA	
Zone 7					
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	NA	NA	No Effect on Potential for Degradation	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
BAWSCA Agencies	NA	NA	No Effect on Potential for Degradation	NA	
CCWD					
EBMUD					
SCVWD[2]	NA	NA	No Effect on Potential for Degradation	NA	
SFPUC	NA	NA	No Effect on Potential for Degradation	NA	
Zone 7					

1. Concept assumes target TDS of 40 mg/L.
2. Details of SCVWD participation to be determined in future studies. Water quality analysis assumes treated East Bay Saline GW Desalinated supply is blended in the SCVWD distribution system.

Concept: East Bay Saline Groundwater Desalination

Table G10-2a - Public Health Protection Score Card by Agency

Agency: ACWD

			Agency Baseline			Concept[1]		Baseline Plus Concept		
Performance Measure/Objective	Metric or Qual	Units	ACWD Source Water (SWP)	ACWD Treated Water (MSJWTP)	ACWD Treated Water (WTP 2)	East Bay Saline Groundwater Desal Source Water	East Bay Saline Groundwater Desal Treated Water	Agency Baseline Plus East Bay Saline Groundwater Source Water	Agency Baseline Plus East Bay Saline Groundwater Treated Water	Notes
Supply Quantity										
Critical Year		AFY	20,600			16,000		36,600		The concept provides up to 16,000 AFY of treated desalinated water (0 AFY of untreated source water) potentially injected into the ACWD distribution system.
Extended Dry Year		AFY	25,500			16,000		41,500		
Average Year		AFY	42,700			16,000		42,700		
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	0.02	NA	NA	
	Mean	mg/L	0.37	0.28	0.33	NA	0.02	NA	NA	
TOC	Range	mg/L	3.4 - 7.3333	2.9 - 6.4	2.3 - 5.5	NA	0.1	NA	NA	
	Mean	mg/L	5.06	4.38	3.7	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.506	0.03 - 0.413	0.04 - 0.47	NA	0.02	NA	NA	
	Mean	mg/L	0.26	0.20	0.23	NA	0.02	NA	NA	
TOC	Range	mg/L	1.6 - 7.3333	1.3 - 6.4	0.9 - 5.5	NA	0.1	NA	NA	
	Mean	mg/L	3.70	3.17	2.6	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	0.02	NA	NA	
	Mean	mg/L	0.19	0.14	0.17	NA	0.02	NA	NA	
TOC	Range	mg/L	2.8 - 5.9025	2.4 - 5.1	1.9 - 4.3	NA	0.1	NA	NA	
	Mean	mg/L	3.99	3.43	2.8	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	40	NA	NA	
	Mean	mg/L	507	529	561	NA	40	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	40	NA	NA	
	Mean	mg/L	384	406	438	NA	40	NA	NA	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	40	NA	NA	
	Mean	mg/L	296	319	350	NA	40	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	mg/L	NA	ND - ND	2 - 6	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	4	NA	ND	NA	NA	
THM4	Range	mg/L	NA	82 - 153	26 - 42	NA	ND	NA	NA	
	Mean	mg/L	NA	110	33	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	47 - 75	16 - 21	NA	1	NA	NA	
	Mean	mg/L	NA	61	19	NA	1	NA	NA	
Extended Dry Year										
Bromate	Range	mg/L	NA	ND - ND	1 - 5	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	3	NA	ND	NA	NA	
THM4	Range	mg/L	NA	50 - 142	16 - 38	NA	ND	NA	NA	
	Mean	mg/L	NA	83	26	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	22 - 92	11 - 26	NA	1	NA	NA	
	Mean	mg/L	NA	52	17	NA	1	NA	NA	
Average Year										
Bromate	Range	mg/L	NA	ND - ND	1 - 4	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	2	NA	ND	NA	NA	
THM4	Range	mg/L	NA	68 - 116	21 - 33	NA	ND	NA	NA	
	Mean	mg/L	NA	85	26	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	41 - 74	14 - 22	NA	1	NA	NA	
	Mean	mg/L	NA	57	19	NA	1	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	

1. Concept assumes target TDS of 40 mg/L.

Concept: East Bay Saline Groundwater Desalination

Table G10-2b - Public Health Protection Score Card by Agency

Agency: SFPUC

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline		Concept[1]		Baseline Plus Concept		Notes
			SFPUC Source Water	SFPUC Treated Water	East Bay Saline Groundwater Desal Source Water	East Bay Saline Groundwater Desal Treated Water	Agency Baseline Plus East Bay Saline Groundwater Source Water	Agency Baseline Plus East Bay Saline Groundwater Treated Water	
Supply Quantity									
Critical Year		AFY	157,000		16,000		173,000		
Extended Dry Year		AFY	255,000		16,000		271,000		The concept provides up to 16,000 AFY of treated desalinated water (0 AFY of untreated source water) potentially injected into the BDPLs in dry years.
Average Year		AFY	329,000		0		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.03	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.03	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.2	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.03	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.03	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.2	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.03	NA	NA	
	Mean	mg/L	0.01	0.01	NA	0.03	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.2	NA	NA	
	Mean	mg/L	1.7	1.6	NA	0.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40	NA	NA	
	Mean	mg/L	26	26	NA	40	NA	NA	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40	NA	NA	
	Mean	mg/L	42	42	NA	40	NA	NA	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40	NA	NA	
	Mean	mg/L	40	40	NA	40	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	34 - 47	NA	1	NA	NA	
	Mean	mg/L	NA	38	NA	1	NA	NA	
HAA5	Range	mg/L	NA	28 - 40	NA	2	NA	NA	
	Mean	mg/L	NA	32	NA	2	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	33 - 50	NA	1	NA	NA	
	Mean	mg/L	NA	38	NA	1	NA	NA	
HAA5	Range	mg/L	NA	24 - 44	NA	2	NA	NA	
	Mean	mg/L	NA	30	NA	2	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	24 - 43	NA	1	NA	NA	
	Mean	mg/L	NA	33	NA	1	NA	NA	
HAA5	Range	mg/L	NA	22 - 34	NA	2	NA	NA	
	Mean	mg/L	NA	28	NA	2	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. Concept assumes target TDS of 40 mg/L.

Concept: East Bay Saline Groundwater Desalination

Table G10-2a - Public Health Protection Score Card by Agency1

Agency: SCVWD

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline		Concept^{1,2}		Baseline Plus Concept		Notes
			SCVWD Source Water (SWP)	SCVWD Treated Water (SWP)	East Bay Saline Groundwater Desal Source Water	East Bay Saline Groundwater Desal Treated Water	Agency Baseline Plus East Bay Saline Groundwater Source Water	Agency Baseline Plus East Bay Saline Groundwater Treated Water	
Supply Quantity									
Critical Year		AFY	39,400		16,000		55,400		
Extended Dry Year		AFY	63,000		16,000		79,000		
Average Year		AFY	97,800		16,000		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.03	NA	NA	
	Mean	mg/L	0.37	0.33	NA	0.03	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.2	NA	NA	
	Mean	mg/L	5.1	3.9	NA	0.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.03	NA	NA	
	Mean	mg/L	0.26	0.24	NA	0.03	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.2	NA	NA	
	Mean	mg/L	3.7	2.7	NA	0.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.03	NA	NA	
	Mean	mg/L	0.19	0.17	NA	0.03	NA	NA	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.2	NA	NA	
	Mean	mg/L	4.0	3.0	NA	0.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	40	NA	NA	
	Mean	mg/L	507	527	NA	40	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	40	NA	NA	
	Mean	mg/L	384	404	NA	40	NA	NA	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	40	NA	NA	
	Mean	mg/L	296	316	NA	40	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	ND	NA	NA	
	Mean	mg/L	NA	6	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	27 - 44	NA	1	NA	NA	
	Mean	mg/L	NA	34	NA	1	NA	NA	
HAA5	Range	mg/L	NA	11 - 14	NA	2	NA	NA	
	Mean	mg/L	NA	13	NA	2	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	ND	NA	NA	
	Mean	mg/L	NA	4	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	16 - 40	NA	1	NA	NA	
	Mean	mg/L	NA	27	NA	1	NA	NA	
HAA5	Range	mg/L	NA	7 - 18	NA	2	NA	NA	
	Mean	mg/L	NA	11	NA	2	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	ND	NA	NA	
	Mean	mg/L	NA	3	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	22 - 34	NA	1	NA	NA	
	Mean	mg/L	NA	27	NA	1	NA	NA	
HAA5	Range	mg/L	NA	9 - 15	NA	2	NA	NA	
	Mean	mg/L	NA	12	NA	2	NA	NA	
Minimize Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	

1. Concept assumes target TDS of 40 mg/L.

2. Details of SCVWD participation to be determined in future studies. Water quality analysis assumes treated East Bay Saline GW Desalinated supply is blended in the SCVWD distribution system.

Concept: East Bay Saline Groundwater Desalination

Table G10-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	**Portfolio** **Amount or Score**	**Notes/Other**
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Capital costs associated with the desalination on-site facilities are projected to be $75 million ($2005). Capital costs of ancillary facilities and conveyance, operating and life-cycle costs to be determined as part of future studies.
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	Allocation of Costs will not be determined as part of this study.
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): Low Impact** . Construction and operation of the concept facilities would primarily consist of temporary, construction-related effects. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities to reduce construction and operation impacts include alternative siting of facilities to avoid sensitive resources to the extent feasible, preconstruction surveys (e.g., for special-status species), implementation of site-specific measures (e.g., monitoring during construction, use of exclusionary fencing, restoration), restriction on construction schedule (e.g., during breeding / nesting season of certain bird species if their nests are found nearby), etc. These mitigation measures would ensure that short-term effects are reduced.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Implementation of this concept would slightly reduce pumping from the Delta, and thus would be considered an environmental benefit to Delta resources. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would unlikely result in additional benefits to the environment.	
Implementation Potential		
External Support	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts is likely to be viewed as an environmentally friendly alternative and generate external support.	
Ability to Get Outside Funding	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation rather than storage concepts, as well as the large number of benefiting agencies, has historically increased the likelihood of external funding.	
Consistency with Local and Regional Plans	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	2	ACWD, SFPUC
Population Receiving Benefits	2,200,000 people	

1. To be determined in future studies.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Concept: East Bay Saline Groundwater Desalination

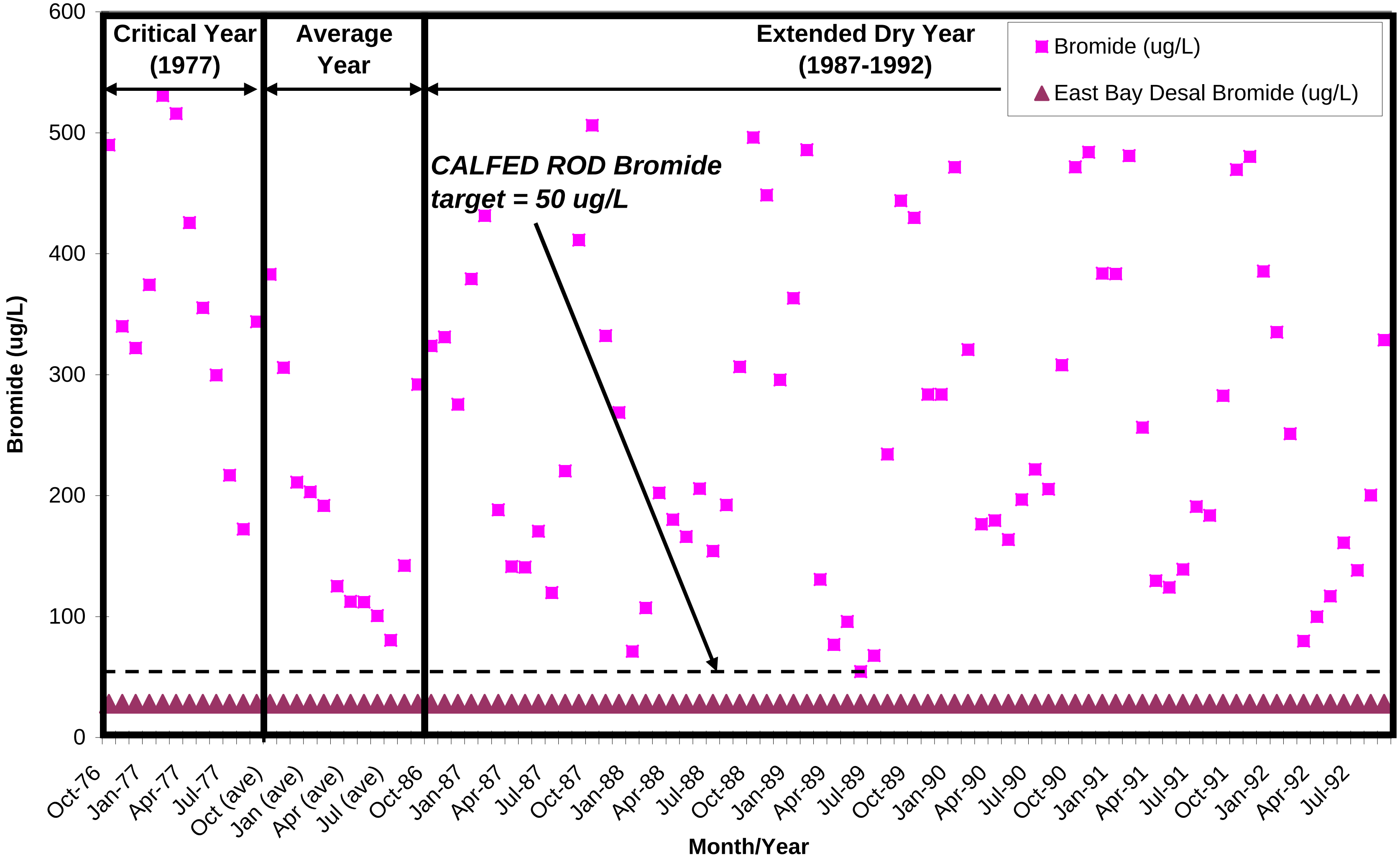
Table G10-4 - Environmental Score Card

Performance Measure/Objective	Portfolio Score
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources). Effects on aquatic resources from brine discharge are not expected if brine is mixed and diluted with wastewater prior to discharge (e.g., use of EBDA facilities). Construction of concept facilities (desal plant, wells, and pipeline) would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The locations of concept facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, the location of these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new pipelines are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of other facilities could temporarily affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. However, effects to wetlands may affect associated special status species, either from facility siting or construction. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities for wetlands would be the same as those identified above for Wetlands Resources. Protection of wetlands (or provision of additional wetlands) would protect special status wetland species.
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD^1.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant and related facilities. As Hetch Hetchy hydropower (via the Newark Substation) would provide energy to operate concept facilities, no increase in pollutant emissions is anticipated. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD^1.** No increase in pollutant emissions is anticipated. Mitigation opportunities have not been identified to reduce the increase in energy usage.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

1. To be determined in future studies.

Concept: East Bay Saline Groundwater Desalination

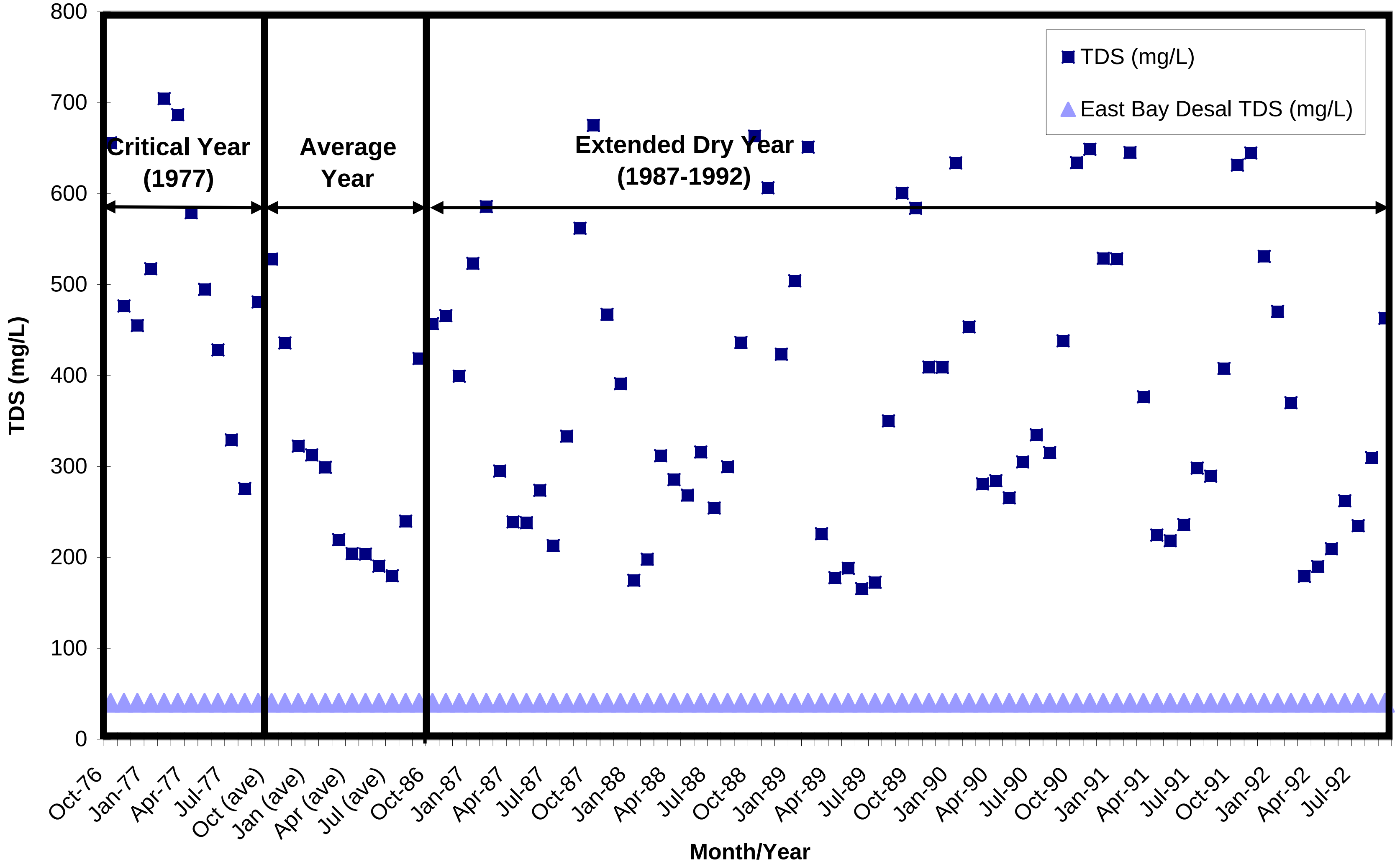
Comparison of ACWD Source Water Bromide with East Bay Saline Groundwater Desalination Concept Bromide



Note: East Bay Desal Bromide reflects bromide in pure desalinated supply. This will be blended with ACWD supplies in the distribution system.

Concept: East Bay Saline Groundwater Desalination

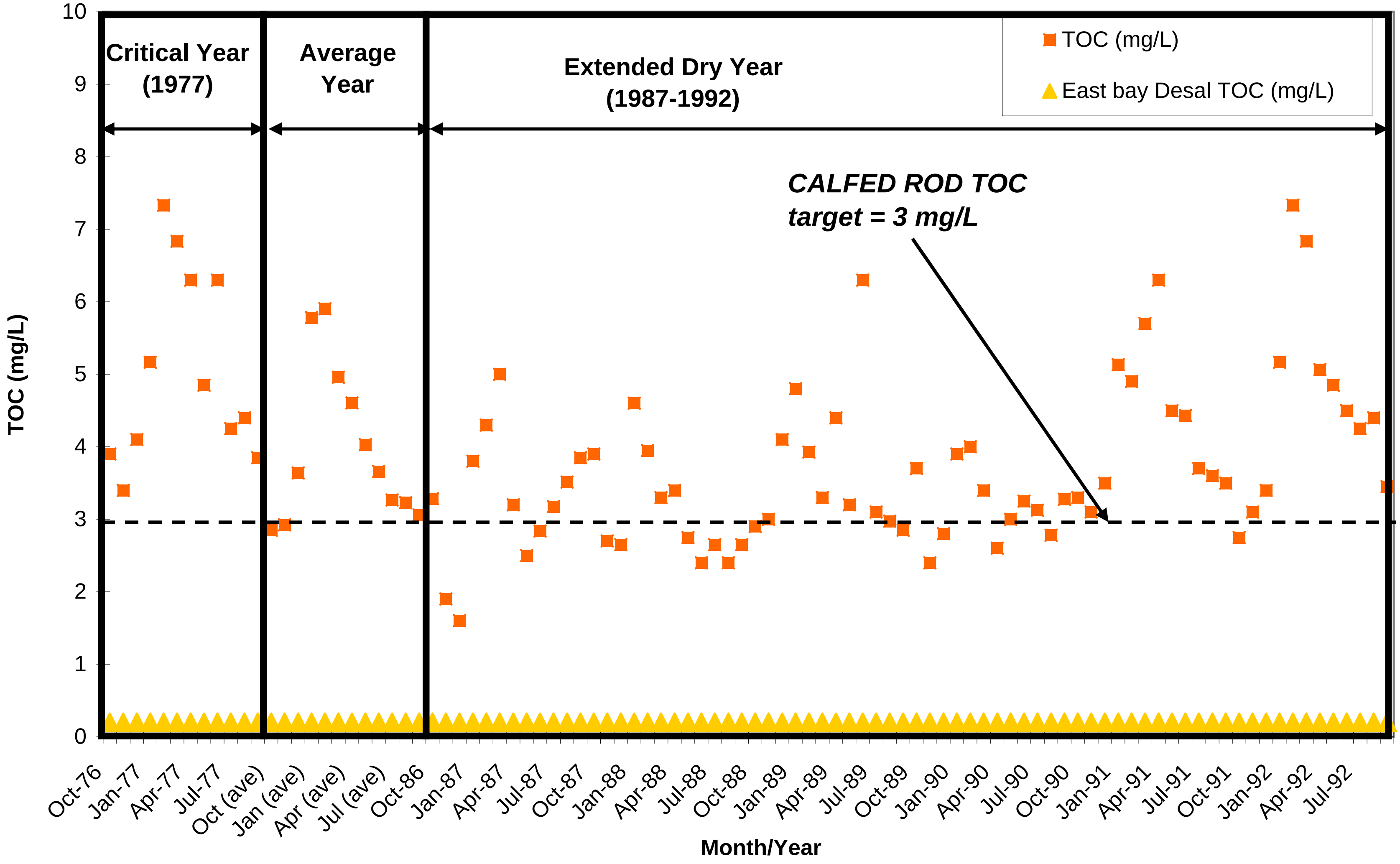
Comparison of ACWD Source Water TDS with East Bay Saline Groundwater Desalination Concept TDS



Note: East Bay Desal TDS reflects TDS in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. TDS target of 40 mg/L selected.

Concept: East Bay Saline Groundwater Desalination

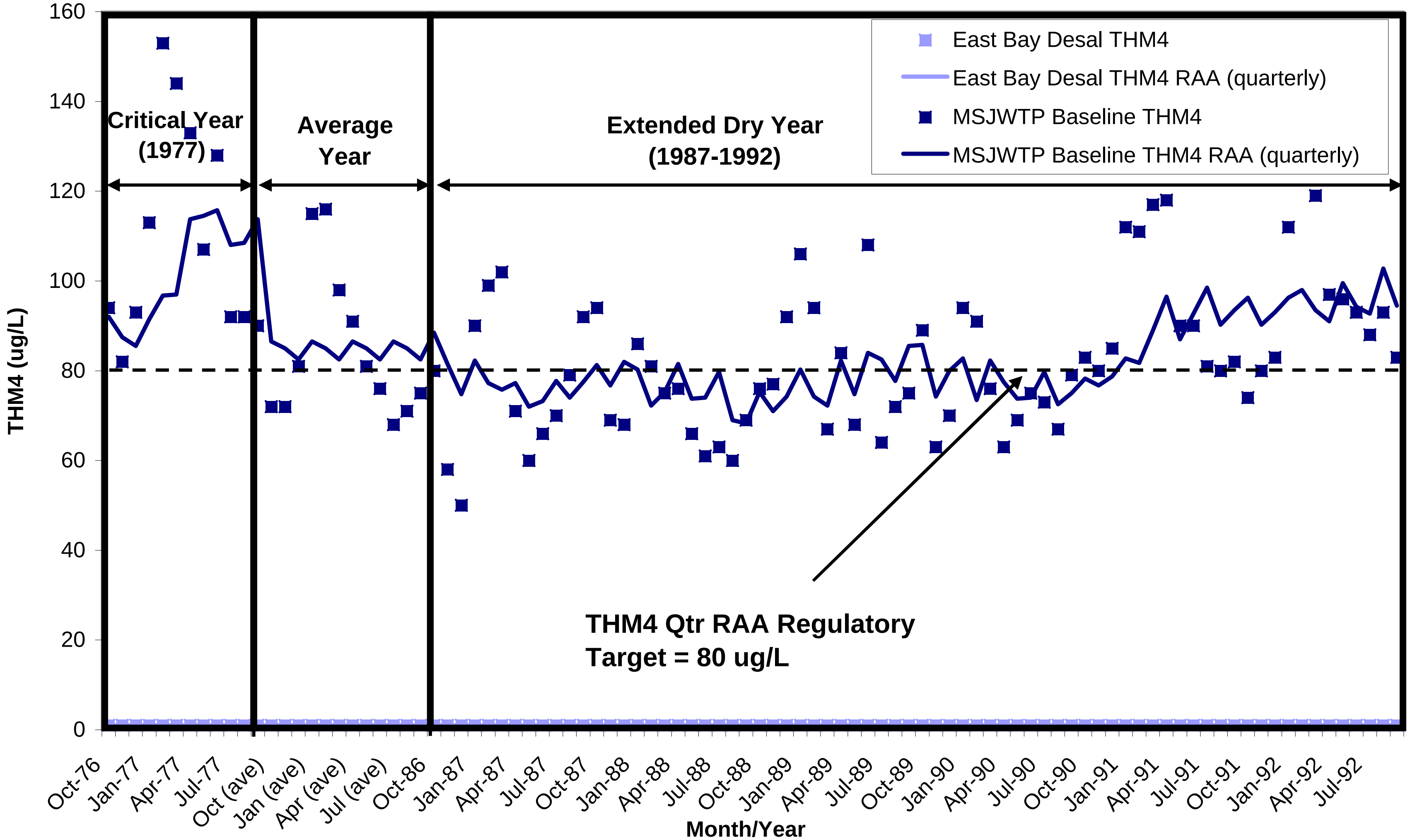
**Comparison of ACWD Source Water TOC with
East Bay Saline Groundwater Desalination Concept TOC**



Note: East Bay Desal TOC reflects TOC in pure desalinated supply. This will be blended with ACWD supplies in the distribution system.

Concept: East Bay Saline Groundwater Desalination

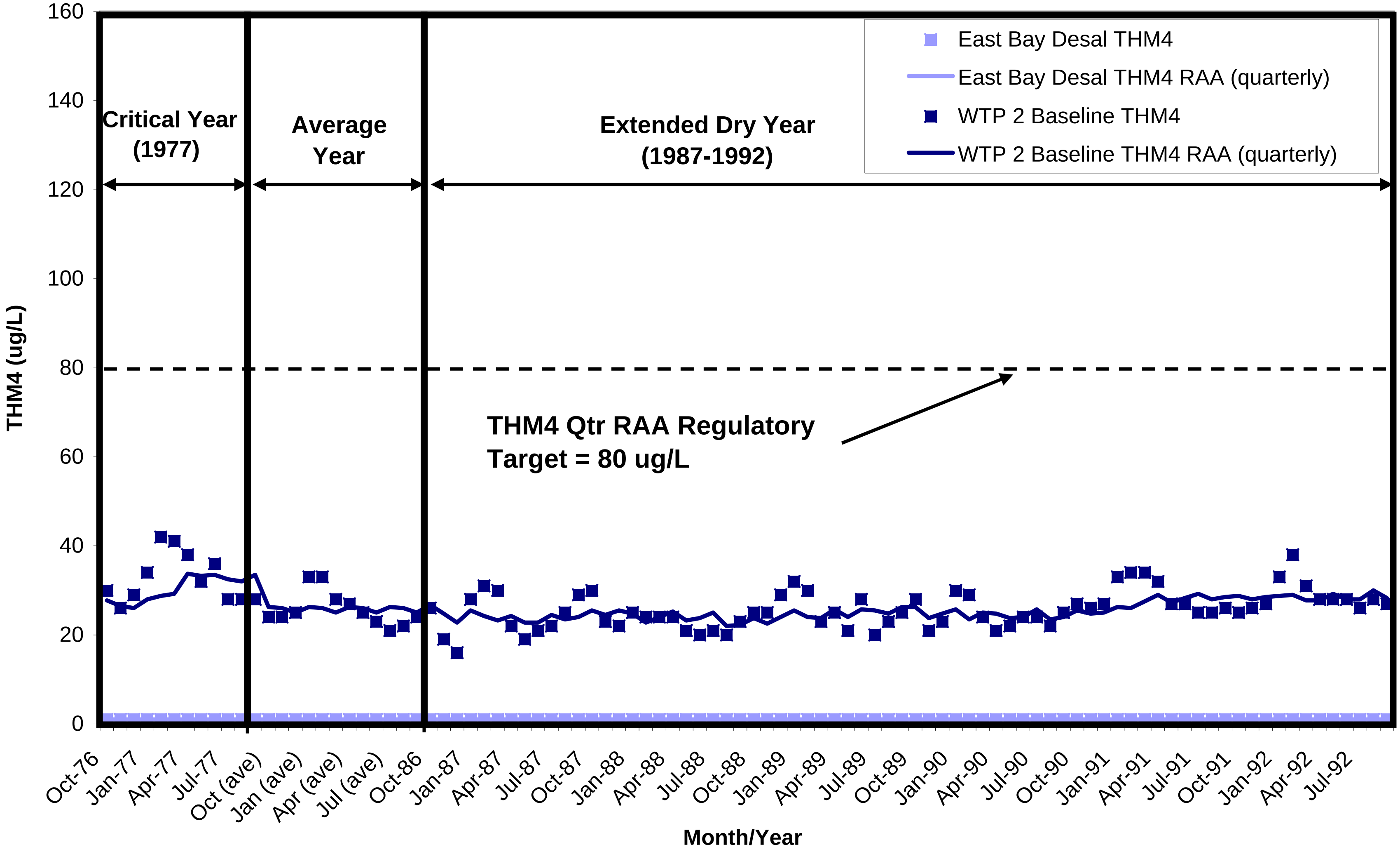
Comparison of ACWD Baseline THM4 with East Bay Saline Groundwater Desalination THM4 (MSJWTP)



Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for MSJWTP .

Concept: East Bay Saline Groundwater Desalination

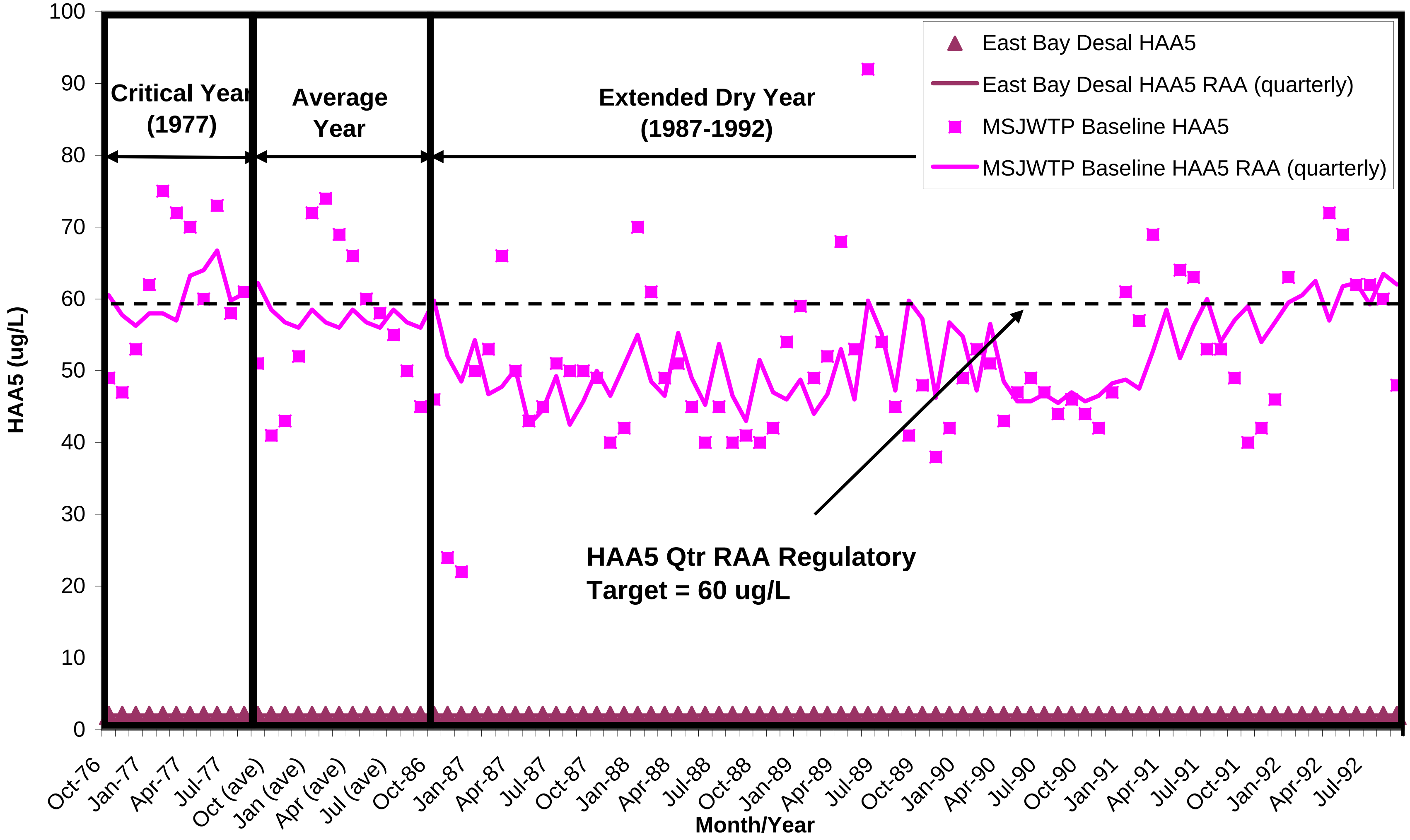
Comparison of ACWD Baseline THM4 with East Bay Saline Groundwater Desalination THM4 (WTP 2)



Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for WTP 2 .

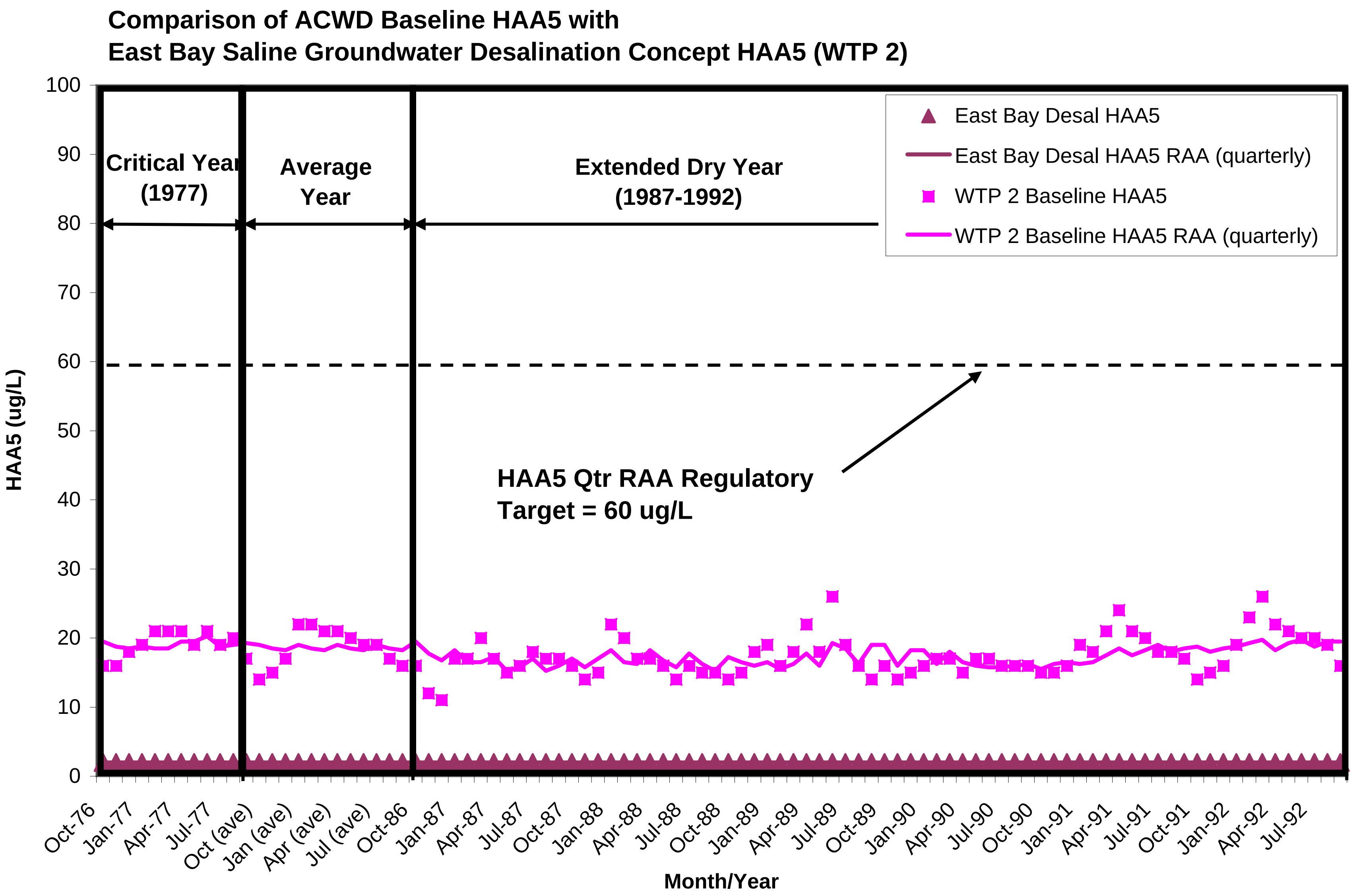
Concept: East Bay Saline Groundwater Desalination

**Comparison of ACWD Baseline HAA5 with
East Bay Saline Groundwater Desalination Concept HAA5 (MSJWTP)**



Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for MSJWTP .

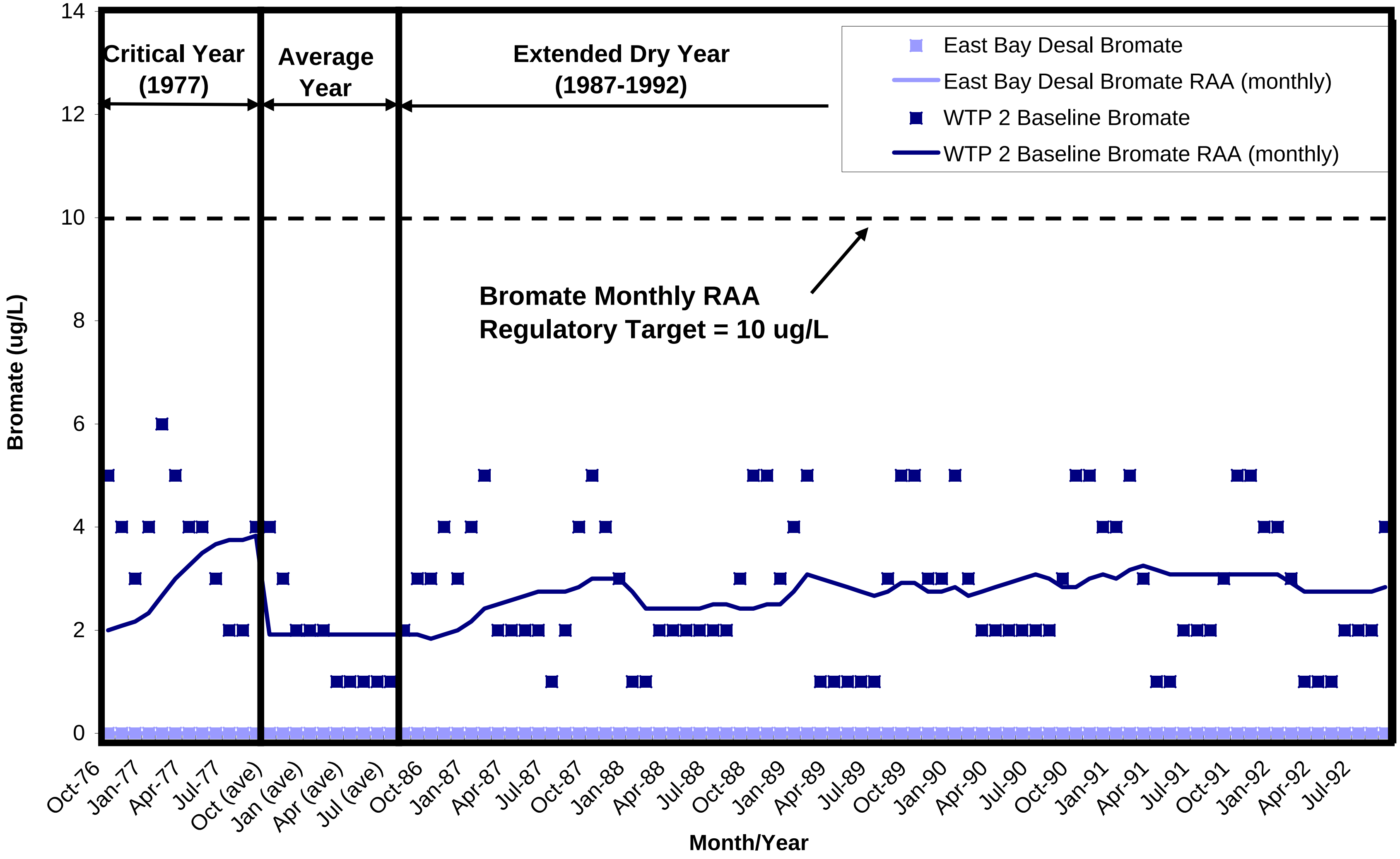
Concept: East Bay Saline Groundwater Desalination



Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for WTP 2.

Concept: East Bay Saline Groundwater Desalination

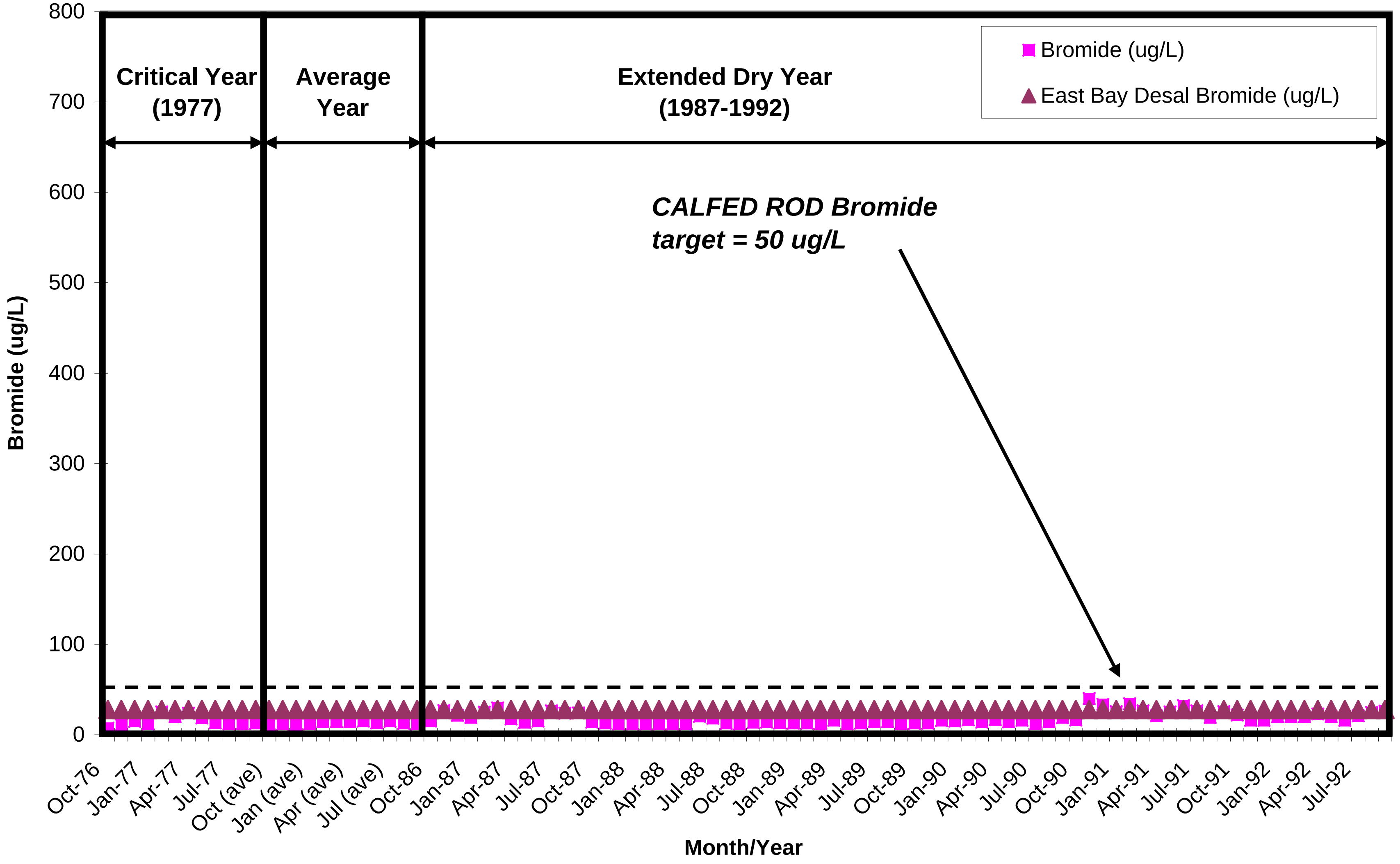
Comparison of ACWD Baseline Bromate with East Bay Saline Groundwater Desalination Concept Bromate (WTP 2)



Note: East Bay Desal is not expected to generate detectable concentrations of bromate. Simulated DBP production for WTP 2 .

Concept: East Bay Saline Groundwater Desalination

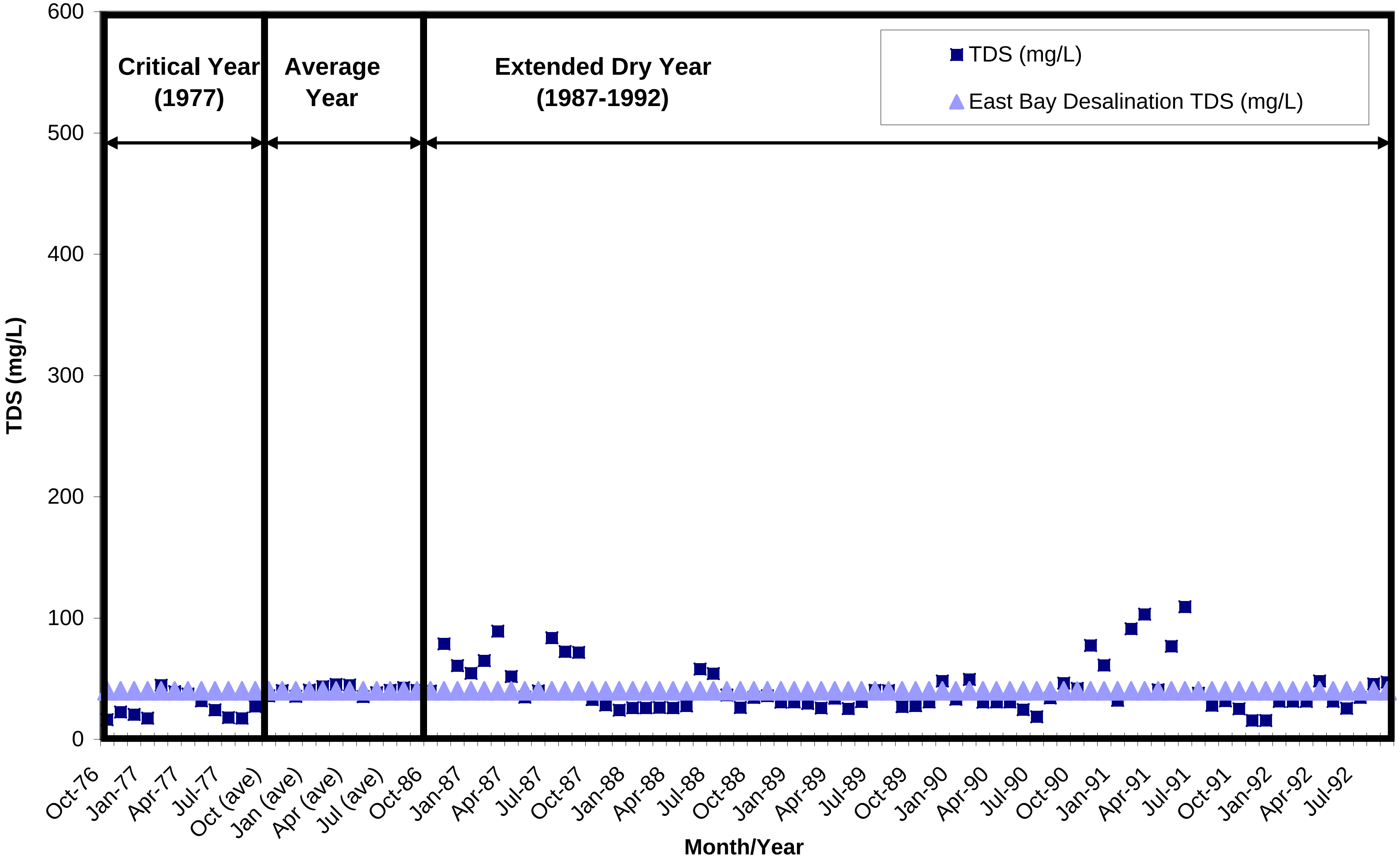
Comparison of SFPUC Baseline Source Water Bromide with East Bay Saline Groundwater Desalination Concept Bromide



Note: East Bay Desal Bromide reflects bromide in pure desalinated supply. This would be blended with SFPUC supplies in the distribution system.

Concept: East Bay Saline Groundwater Desalination

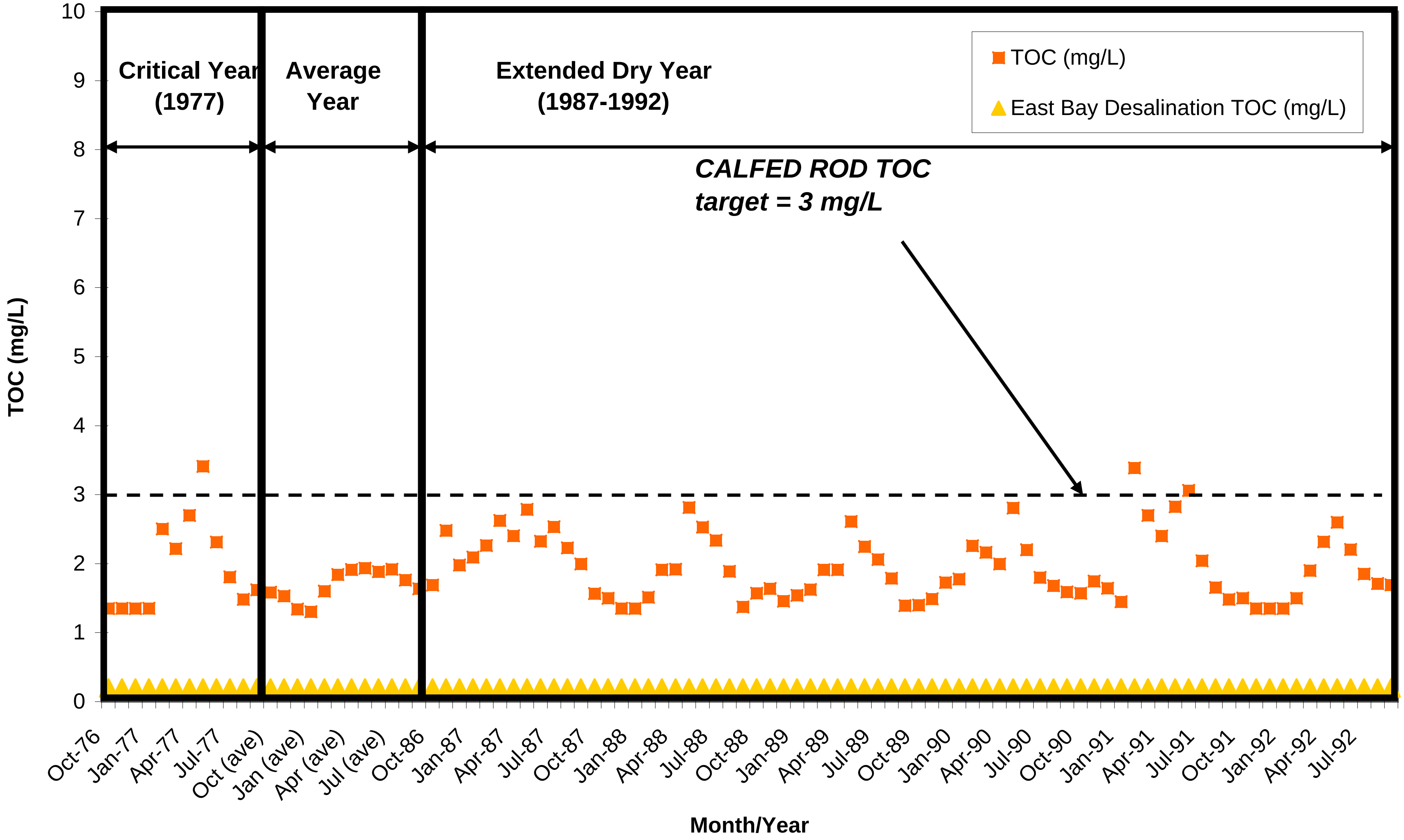
Comparison of SFPUC Baseline Source Water TDS with East Bay Saline Groundwater Desalination Concept TDS



Note: East Bay Desal TDS reflects TDS in pure desalinated supply. This would be blended with SFPUC supplies in the distribution system. TDS target of 40 mg/L selected.

Concept: East Bay Saline Groundwater Desalination

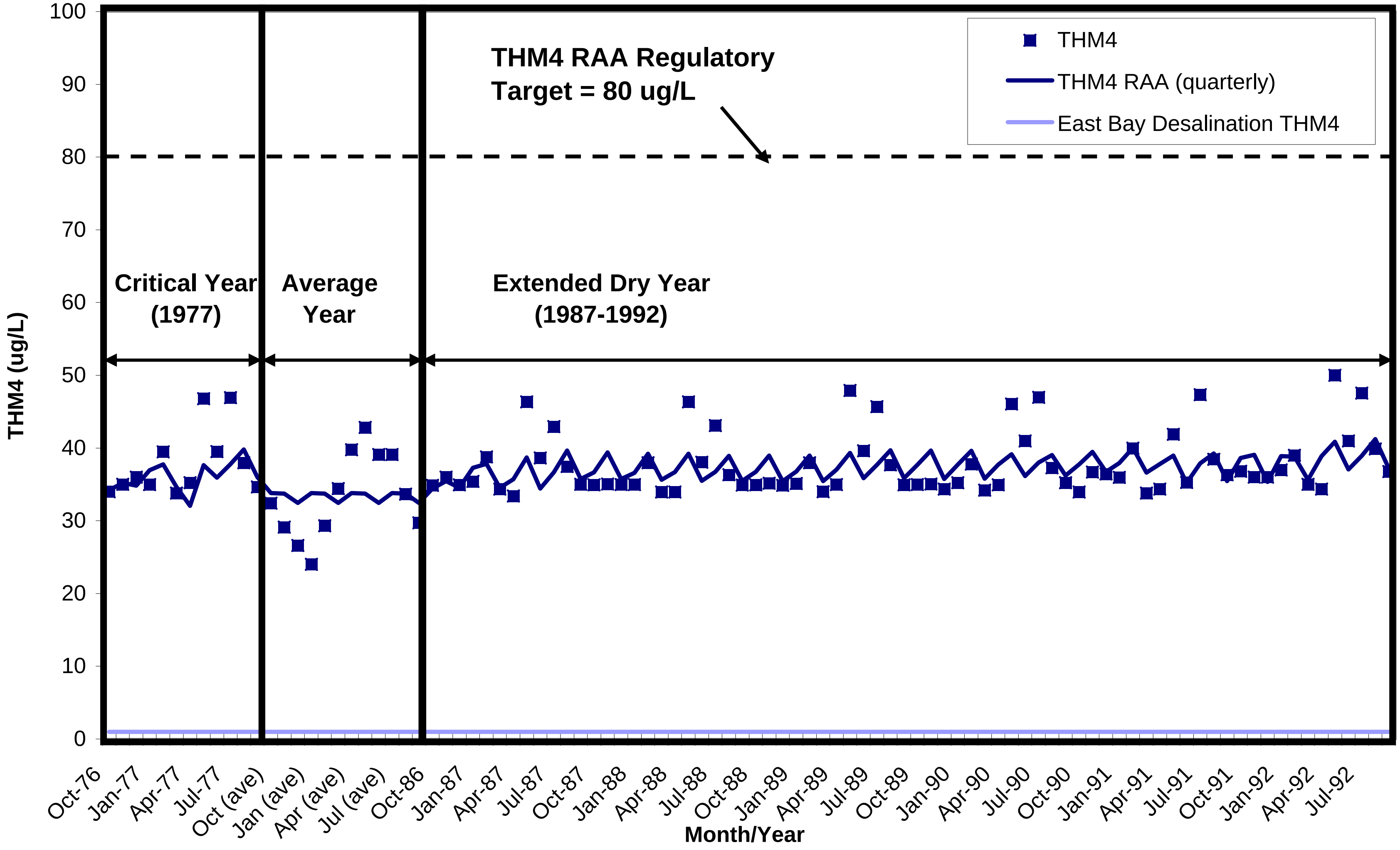
Comparison of SFPUC Baseline Source Water TOC with East Bay Saline Groundwater Desalination Concept TOC



Note: East Bay Desal TOC reflects TOC in pure desalinated supply. This would be blended with SFPUC supplies in the distribution system.

Concept: East Bay Saline Groundwater Desalination

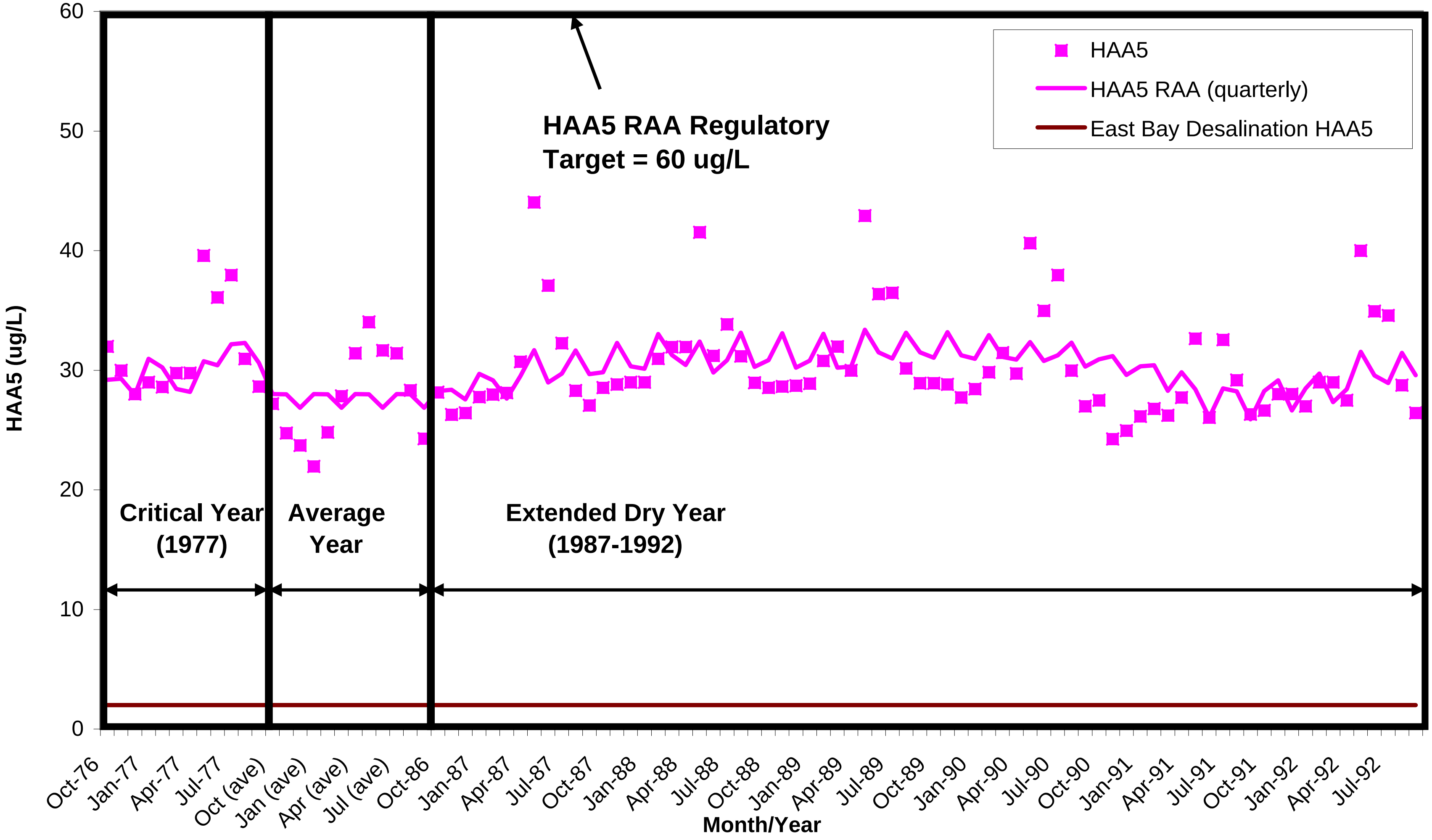
Comparison of SFPUC Baseline THM4 with
East Bay Saline Groundwater Desalination Concept THM4



Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This would be blended with SFPUC supplies in the distribution system. Simulated DBP production for supply entering BDPLs.

Concept: East Bay Saline Groundwater Desalination

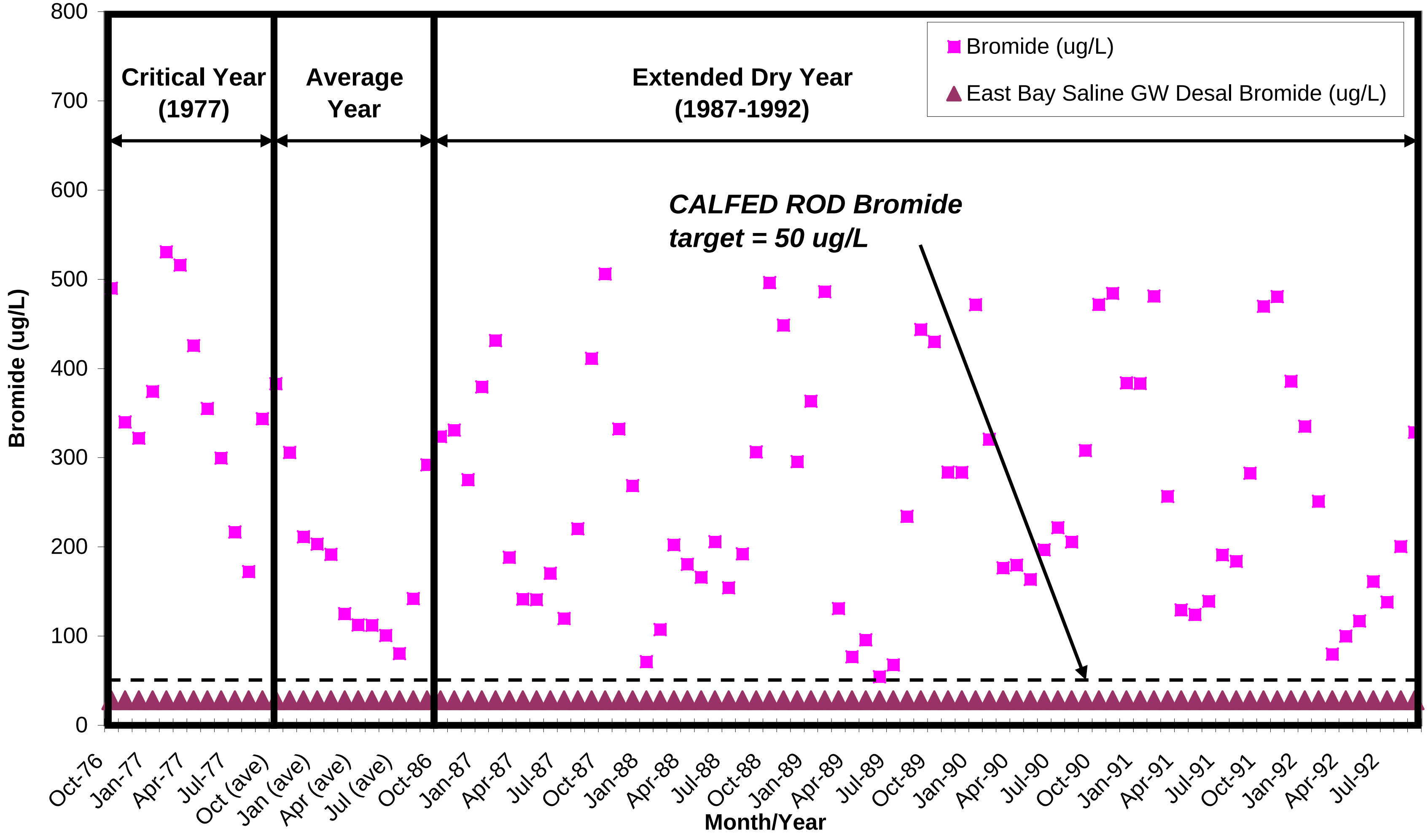
Comparison of SFPUC Baseline HAA5 with
East Bay Saline Groundwater Desalination Concept HAA5



Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This would be blended with SFPUC supplies in the distribution system. Simulated DBP production for supply entering BDPLs.

Concept: East Bay Saline Groundwater Desalination

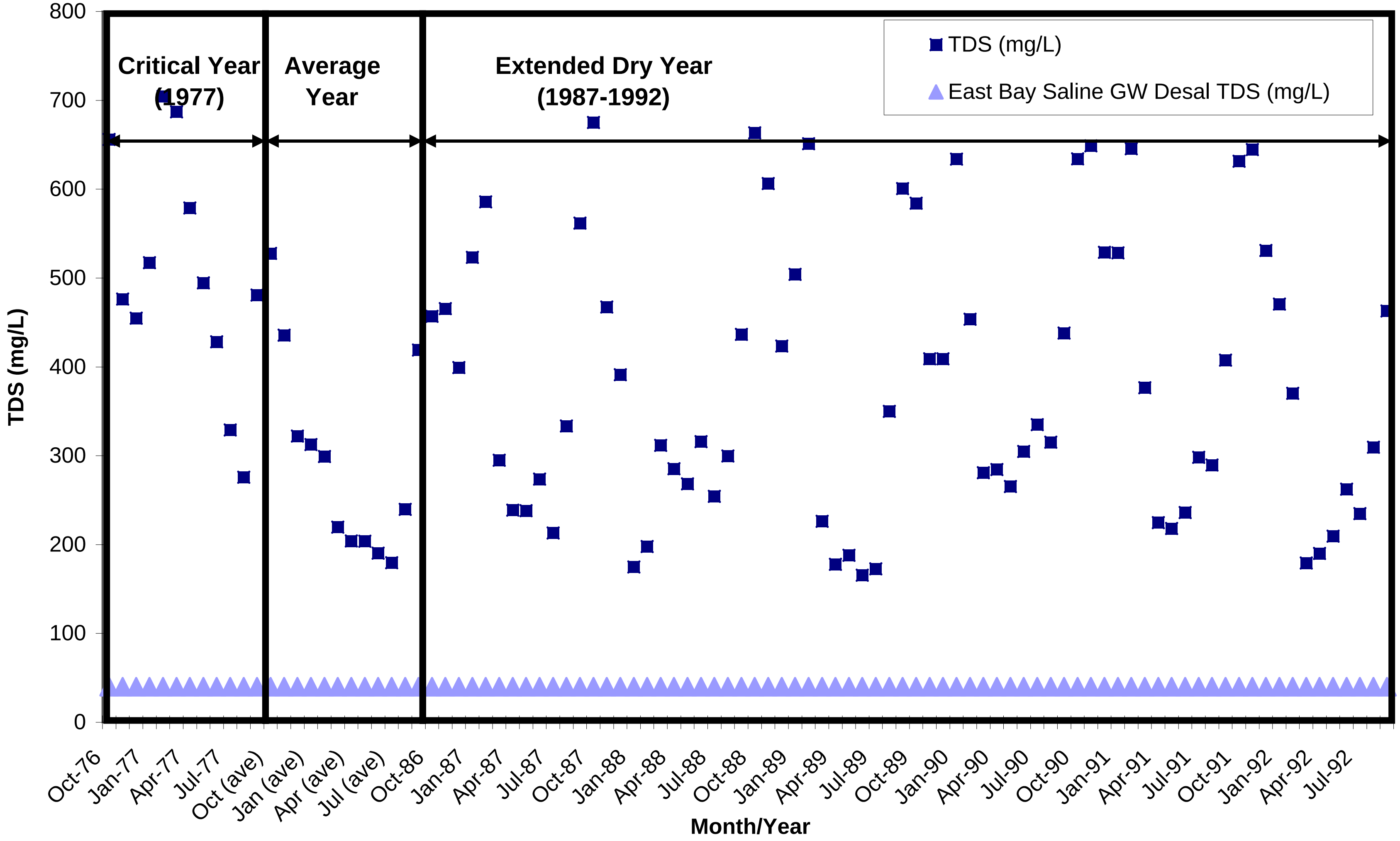
Comparison of SCVWD Baseline Source Water Bromide with East Bay Saline Groundwater Desalination Concept Bromide



Note: East Bay Desal bromide reflects bromide in pure desalinated supply. This would be blended with SCVWD supplies in the distribution system.

Concept: East Bay Saline Groundwater Desalination

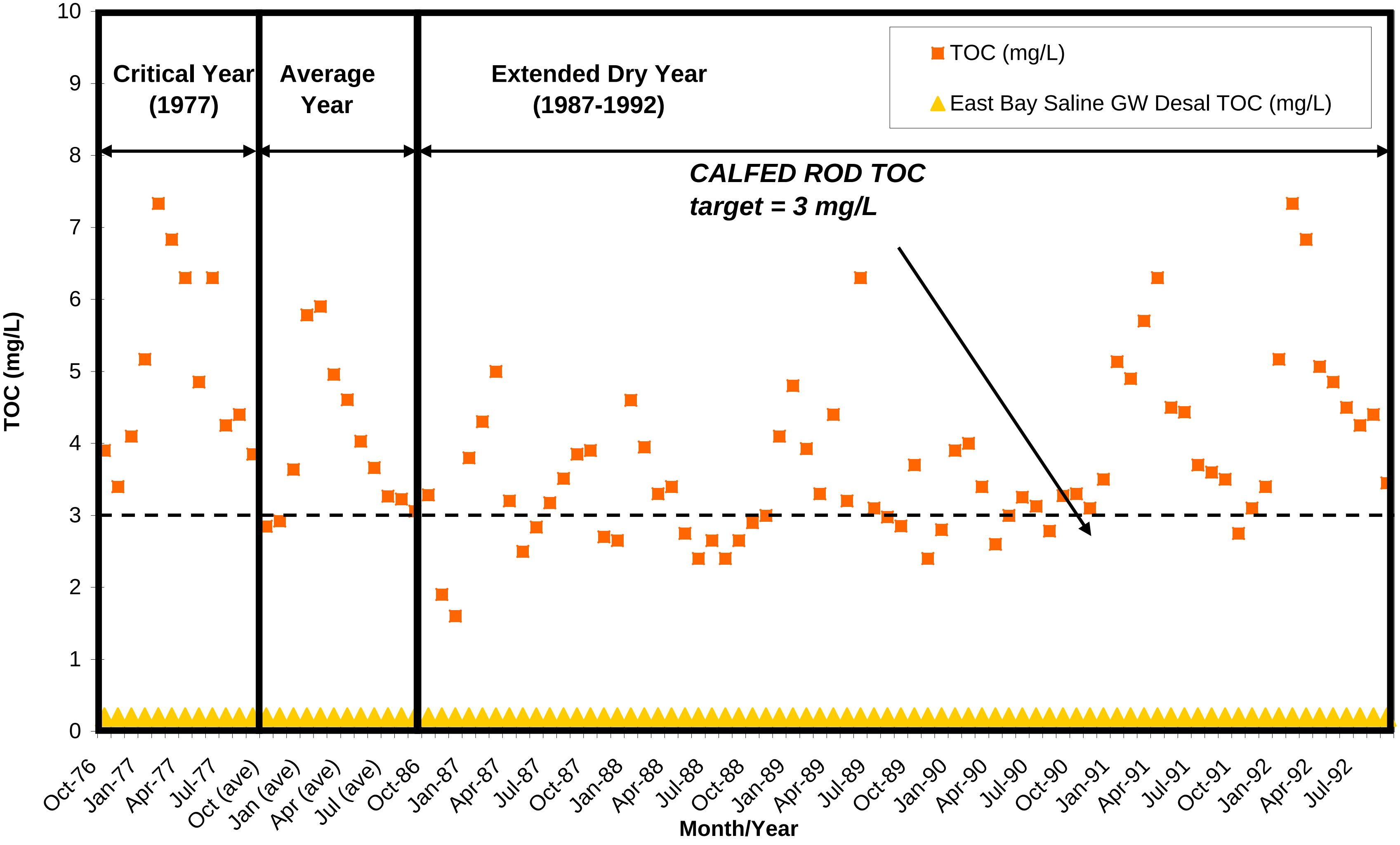
Comparison of SCVWD Baseline Source Water TDS with East Bay Saline Groundwater Desalination Concept TDS



Note: East Bay Desal TDS reflects TDS in pure desalinated supply. This would be blended with SCVWD supplies in the distribution system. TDS target of 40 mg/L selected.

Concept: East Bay Saline Groundwater Desalination

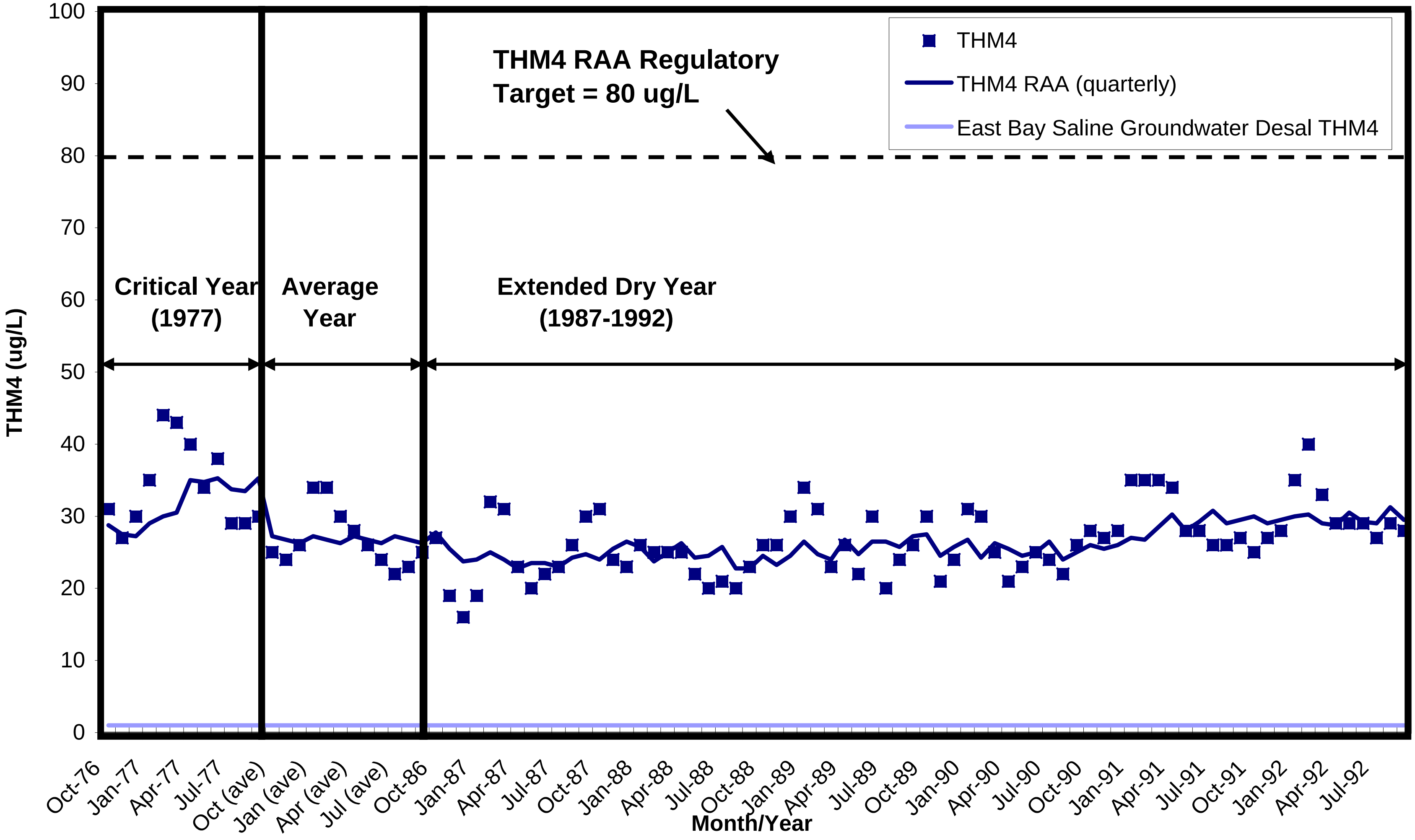
Comparison of SCVWD Baseline Source Water TOC with East Bay Saline Groundwater Desalination TOC



Note: East Bay Desal TOC reflects TOC in pure desalinated supply. This would be blended with SCVWD supplies in the distribution system.

Concept: East Bay Saline Groundwater Desalination

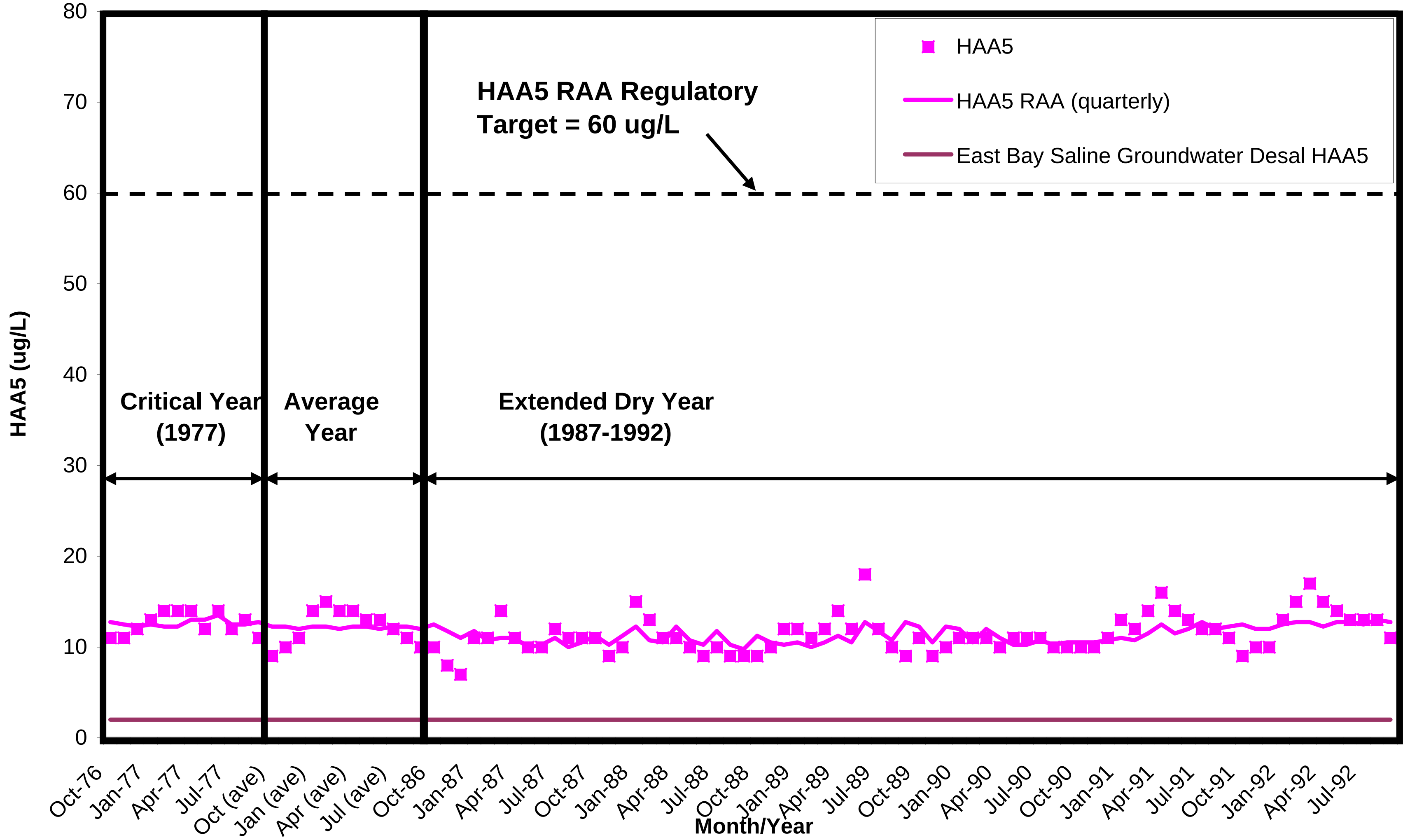
Comparison of SCVWD Baseline THM4 with East Bay Saline Groundwater Desalination THM4



Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This would be blended with SCVWD supplies in the distribution system. Simulated DBP production for settled water ozone .

Concept: East Bay Saline Groundwater Desalination

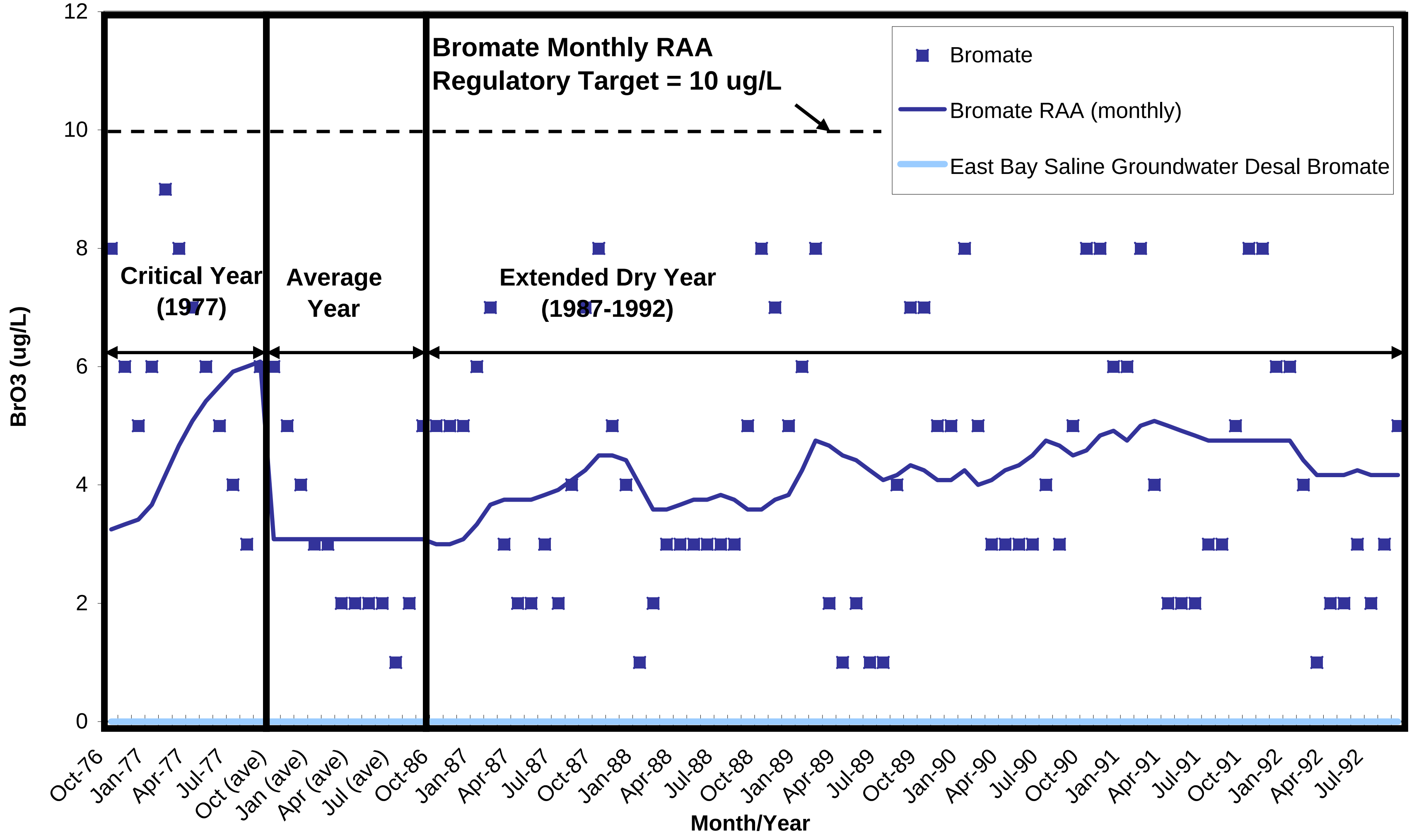
Comparison of SCVWD Baseline HAA5 with East Bay Saline Groundwater Desalination HAA5



Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This would be blended with SCVWD supplies in the distribution system. Simulated DBP production for settled water ozone .

Concept: East Bay Saline Groundwater Desalination

Comparison of SCVWD Baseline Bromate with East Bay Saline Groundwater Desalination Bromate



Note: East Bay Desal is not expected to generate detectable concentrations of bromate. Simulated DBP production for settled water ozone .

G11 Bay Area Use of the Freeport Regional Water Project

G11 Bay Area Use of the Freeport Regional Water Project

DESCRIPTION

EBMUD and Sacramento County Water Agency (SCWA) have formed a Joint Powers Authority called the Freeport Regional Water Authority (FRWA) to implement the Freeport Regional Water Project (FRWP). The project would provide up to 100 MGD of dry-year supply for EBMUD from a new diversion located on the Sacramento River near Freeport. New pipelines would convey water from the Sacramento River to the Folsom South Canal, and from the canal to the EBMUD Mokelumne Aqueducts. The Final Environmental Impact Report for the Freeport Project was released in March 2004 and certified in April 2004. The Environmental Impact Statement was certified in January of 2005. The Bay Area Regional Water Quality and Supply Reliability Program is evaluating the potential regional use of the Freeport facilities during average and wet years to convey water to other interested Bay Area water agencies. Additional analysis will be required to address potential environmental, water rights, institutional and other issues if this concept appears feasible.

Bay Area Use of the Regional Use of Freeport Regional Water Project Concept Summary

Extended Dry Year Supply	0 AFY
Average Year Water Quality Supply	up to 15,000 AFY

Cost ($2005)

Capital Cost	TBD
O&M Cost	TBD
Unit Cost	TBD

Potential Owning Agency
EBMUD

Potential Partners
Zone 7 Water Agency

The Bay Area agency potentially interested in this concept is the Zone 7 Water Agency. The Bay Area Use of Freeport Regional Project would potentially divert water from the Sacramento River and convey it through the Freeport facilities, Mokelumne Aqueduct and EBMUD distribution system, for delivery to Zone 7[1]. This water could be used directly by the Zone 7 retail customers, or injected into the groundwater basin. This concept assumes that water delivered to Zone 7 would be either State Water Project (SWP) water or Sacramento River water purchased by Zone 7. Use of either SWP water or other supplies may require modification of existing water rights or acquisition of new water rights by Zone 7. Water could be conveyed to the Zone 7 distribution system via a new intertie connecting the southern part of EBMUD's San Ramon Valley system with Zone 7 transmission facilities. This study assumed an intertie size of up to 25 MGD, with a potential annual transfer of up to 15,000 acre-feet in average or wet hydrologic years.

Project Facilities for Bay Area Use of the Freeport Regional Water Project

Facility	Notes
Pipeline from EBMUD to Zone 7 (25 MGD): • Regulating Station and, 39" diameter pipeline, up to 40,000 feet.	Conceptual alignment from San Ramon Pressure Zone to north end of Zone 7's Treated Water Transmission System in Dublin.

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[1] EBMUD is currently evaluating a variety of different options for bringing Freeport deliveries into the EBMUD system, including not blending or pre-treating and making deliveries in a dedicated aqueduct, which would significantly affect concept operation and water quality. This concept assumes blending of Freeport supplies with Mokelumne Aqueduct supplies, and does not address the other potential alternatives being evaluated by EBMUD.

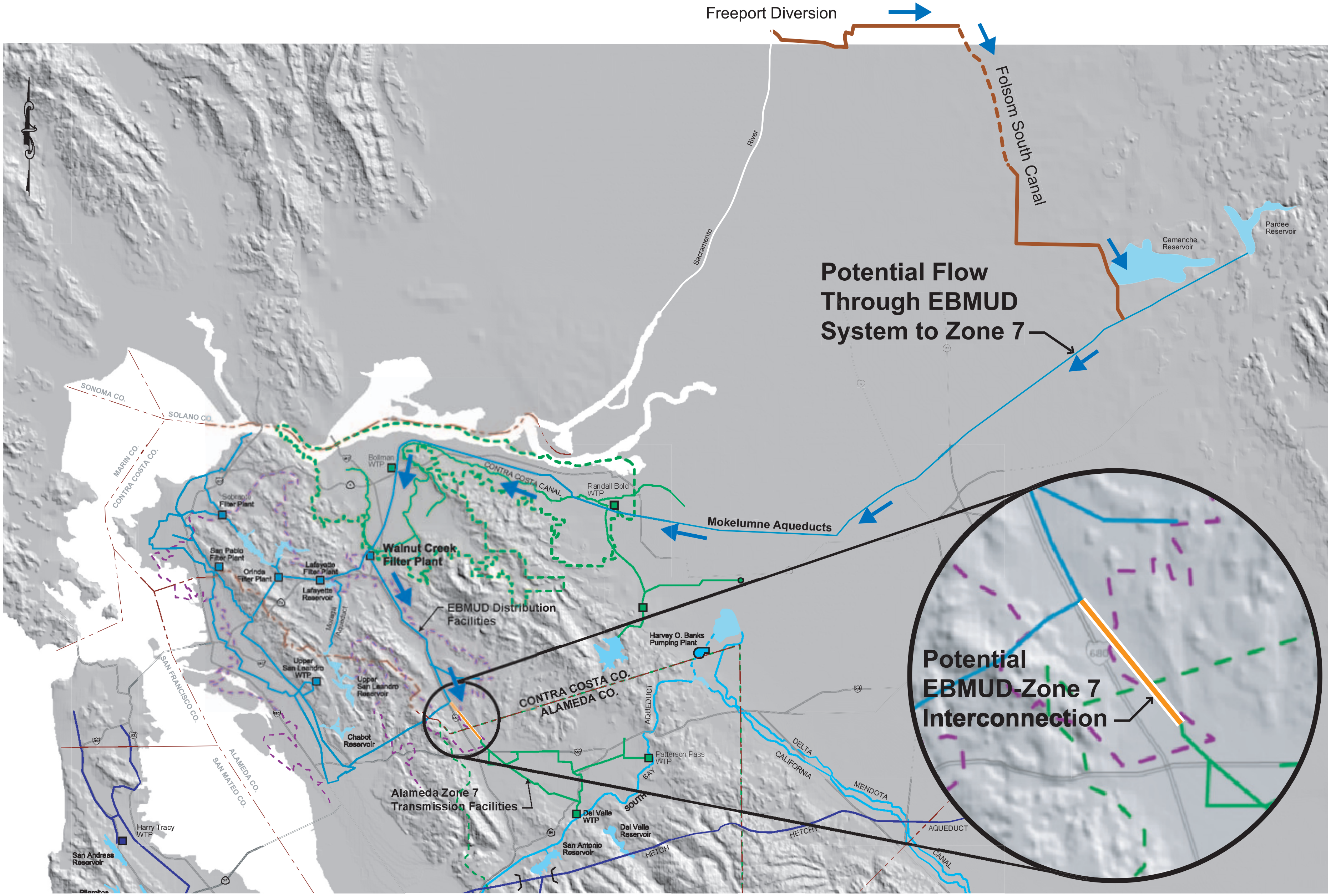

Figure G11-1

Bay Area Use of the Freeport Regional Water Project Concept Facilities

CDM

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Concept: Bay Area Use of Freeport Regional Project

Table G11-1 - Supply Reliability Score Card

Performance Measure/Objective	Agency Baseline Amount or Description	Units	Bay Area Use of Freeport Regional Project Concept Amount or Description	Units	Agency Baseline Plus Bay Area Use of Freeport Regional Project Amount or Description	Units	Notes/Other
Meet Demand	Compares supply from concept with baseline supply						
Critical Drought							Freeport Project is being used by EBMUD in drought years. Bay Area Use of the Freeport Regional Water Project replaces Zone 7 SBA supply in average years.
ACWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	200,430	AFY	0	AFY	200,430	AFY	
SCVWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SFPUC Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Zone 7 Supply (SWP)	38,900	AFY	0	AFY	38,900	AFY	
Total Supply	239,330	AFY	0	AFY	239,330	AFY	
Extended Drought							
ACWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	216,420	AFY	0	AFY	216,420	AFY	
SCVWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SFPUC Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Zone 7 Supply	56,400	AFY	0	AFY	56,400	AFY	
Total Supply	272,820	AFY	0	AFY	272,820	AFY	
Average Year							
ACWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
BAWSCA Agencies' Supply	N/A	AFY	N/A	AFY	N/A	AFY	
CCWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
EBMUD Supply	255,590	AFY	0	AFY	255,590	AFY	
SCVWD Supply	N/A	AFY	N/A	AFY	N/A	AFY	
SFPUC Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Zone 7 Supply	71,400	AFY	Up to 15,000	AFY	71,400	AFY	
Total Supply	326,990	AFY	Up to 15,000	AFY	326,990	AFY	
Vulnerability							
ACWD	N/A		N/A				
BAWSCA Agencies	N/A		N/A				
CCWD	N/A		N/A				
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.		No Effect on Vulnerability - Wheeling water through the EBMUD system will have no effect on EBMUD vulnerability.				
SCVWD	N/A		N/A				
SFPUC	N/A		N/A				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Provides separate connection point to Zone 7 if South Bay Aqueduct or Delta supply were interrupted. Availability limited to winter months of average years, during non-emergency conditions in EBMUD system.				
Self-Sufficiency within the Region							
No Effect on Self-Sufficiency within the Region - Agreements required with EBMUD, who would control project operation. Project implementation would not only require agreements between Zone 7 and EBMUD, but could involve the State of California (changes to point of diversion) and Sacramento Municipal Utility District (primary user of Folsom South Canal) and other state and federal agencies.							

Table G11-2 - Public Health Protection Scorecard[1]

Concept: Bay Area Use of the Freeport Regional Water Project

Performance Measure/Objective	Concept[2]		Baseline Plus Concept[3]		Notes
	Bay Area Use of Freeport Regional Project Source Water[4]	Bay Area Use of Freeport Regional Project Treated Water	Bay Area Use of Freeport Regional Project Source Water	Bay Area Use of Freeport Regional Project Treated Water	
Variability for Treatment					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	Increases Variability	NA	NA	NA	Bromide slightly less variable, TOC and TDS more variable. No projected treatment implications.
SCVWD					
SFPUC					
Zone 7	Reduces Variability	NA	NA	NA	All parameters less variable for customers receiving Freeport water.
Total Dissolved Solids					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	Increases TDS	Increases TDS	TDS increased slightly in average years. Well below secondary standard.
SCVWD					
SFPUC					
Zone 7	Reduces TDS	Reduces TDS	NA	NA	TDS reduced for customers receiving Freeport supply.
Disinfection By-Products					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	NA	Increases DBPs	Bromate reduced, THM4s & HAA5 increased.
SCVWD					
SFPUC					
Zone 7	NA	Reduces DBPs	NA	NA	All DBPs reduced for customers receiving Freeport water
Taste and Odor Problems (Excluding TDS)					
ACWD					
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	NA	Degrades T&O	Reduced overall quality
SCVWD					
SFPUC					
Zone 7	NA	Improves T&O	NA	NA	Improved overall quality for customers receiving Freeport water.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD					Incremental impacts associated with operating the Freeport conveyance facilities in average years are projected to be minimal.
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	NA	NA	
SCVWD					
SFPUC					
Zone 7	NA	NA	NA	NA	
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD					Incremental impacts associated with operating the Freeport conveyance facilities in average years are projected to be minimal.
BAWSCA Agencies					
CCWD					
EBMUD	NA	NA	NA	NA	
SCVWD					
SFPUC					
Zone 7	NA	NA	NA	NA	

1. EBMUD is currently exploring a variety of options for conveying Freeport water to EBMUD customers. For the purposes of this analysis, it was assumed that water will be conveyed to the EBMUD distribution system via the Mokelumne Aqueduct. EBMUD water quality presented in the Baseline Plus Concept columns reflect blending of projected Freeport deliveries with projected Mokelumne deliveries. In actuality, water quality impacts of this concept may be isolated to the San Ramon Valley system.
2. Values in these columns represent the quality of the Mokelumne-Freeport blend only, and do not reflect the effects of blending with Zone 7 supplies.
3. Values in these columns represent the quality of the Mokelumne-Freeport blend before and after treatment by EBMUD (source and treated columns, respectively) .
4. Values in this column represent the quality of the Mokelumne-Freeport blend prior to treatment by EBMUD. Note that Zone 7 does not receive untreated water from this concept (Zone 7 receives this water following treatment by EBMUD). Values are presented for reference with respect to CALFED ROD source water improvement targets.

Concept: Bay Area Use of Freeport Regional Project

Table G11-2a - Public Health Protection Score Card by Agency[1]

Agency: EBMUD

			Agency Baseline[2]		Concept		Baseline Plus Concept[3]		
Performance Measure/Objective	**Metric or Qual**	**Units**	**EBMUD Source Water**	**EBMUD Treated Water**	**Bay Area Use of Freeport Regional Project Source Water**	**Bay Area Use of Freeport Regional Project Treated Water**	**Agency Baseline Plus Bay Area Use of Freeport Regional Project Source Water**	**Agency Baseline Plus Bay Area Use of Freeport Regional Project Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	200,430		0		200,430		
Extended Dry Year		AFY	216,420		0		216,420		
Average Year		AFY	255,590		0		255,590		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.05	0.01 - 0.04	NA	NA	NA	NA	
	Mean	mg/L	0.03	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.8 - 3.3	1.1 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	2.7	1.9	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	ND - 0.05	0.00 - 0.05	NA	NA	NA	NA	
	Mean	mg/L	0.02	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.0 - 3.3	0.5 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	1.8	1.1	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.01	0.01 - 0.01	NA	NA	0.01 - 0.01	0.01 - 0.01	
	Mean	mg/L	0.01	0.01	NA	NA	0.01	0.01	
TOC	Range	mg/L	0.6 - 1.3	0.1 - 0.7	NA	NA	0.6 - 1.3	0.1 - 0.7	
	Mean	mg/L	1.0	0.4	NA	NA	1.0	0.5	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	variable	variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	36 - 113	56 - 133	NA	NA	NA	NA	
	Mean	mg/L	80	100	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	28 - 108	48 - 128	NA	NA	NA	NA	
	Mean	mg/L	55	75	NA	NA	NA	NA	
Average Year	Range	mg/L	31 - 37	51 - 57	NA	NA	32 - 44	51 - 63	
	Mean	mg/L	35	54	NA	NA	39	59	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	1	NA	NA	NA	NA	
THM4	Range	ug/L	NA	10 - 16	NA	NA	NA	NA	
	Mean	ug/L	NA	14	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	8 - 12	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	2 - 14	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	5 - 13	NA	NA	NA	NA	
	Mean	ug/L	NA	9	NA	NA	NA	NA	
Average Year									
Bromate	Range	ug/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	ug/L	NA	ND	NA	NA	NA	ND	
THM4	Range	ug/L	NA	3 - 7	NA	NA	NA	3 - 7	
	Mean	ug/L	NA	5	NA	NA	NA	6	
HAA5	Range	ug/L	NA	4 - 8	NA	NA	NA	4 - 8	
	Mean	ug/L	NA	6	NA	NA	NA	7	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	diminished	Lower quality source (higher TDS, TOC)
Algal blooms	Qual		minimal	NA	NA	NA	no change	NA	TOC is not substantially increased, temperature is not greatly affected

1. EBMUD is currently exploring a variety of options for conveying Freeport water to EBMUD customers. For the purposes of this analysis, it was assumed that water will be conveyed to the EBMUD distribution system via the Mokelumne Aqueduct. EBMUD water quality presented in the Baseline Plus Concept columns reflect blending of projected Freeport deliveries with projected Mokelumne deliveries. In actuality, water quality impacts of this concept may be isolated to the San Ramon Valley system.

2. Baseline water quality data was collected from EBMUD and is detailed in the EBMUD section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively) .

Concept: Bay Area Use of Freeport Regional Project

Table G11-2b - Public Health Protection Score Card by Agency [1]

Agency: Zone 7

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline[2]			Concept[3]		Baseline Plus Concept		Notes
			Zone 7 Source Water (SWP)	Zone 7 Treated Water (PPWTP)	Zone 7 Treated Water (DVWTP)	Bay Area Use of Freeport Regional Project Source Water[4]	Bay Area Use of Freeport Regional Project Treated Water	Agency Baseline Plus Bay Area Use of Freeport Regional Project Source Water	Agency Baseline Plus Bay Area Use of Freeport Regional Project Treated Water	
Supply Quantity										
Critical Year		AFY	38,900			0		38,900		
Extended Dry Year		AFY	56,400			0		56,400		
Average Year		AFY	71,400			15,000		71,400		
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	0.01 - 0.01	0.01 - 0.01	NA	NA	
	Mean	mg/L	0.19	0.15	0.15	0.01	0.01	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	0.6 - 1.3	0.1 - 0.7	NA	NA	
	Mean	mg/L	4.0	3.7	3.7	1.0	0.5	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	NA	NA	SBA pH is widely variable, but is buffered during treatment. Freeport/Mokelumne blend pH is less variable.
Temperature	Qual		variable	less variable	less variable	variable	variable	NA	NA	SBA temperature is variable.
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	NA	NA	
	Mean	mg/L	507	517	517	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	NA	NA	
	Mean	mg/L	384	394	394	NA	NA	NA	NA	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	32 - 44	51 - 63	NA	NA	
	Mean	mg/L	296	306	306	39	59	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	NA	
	Mean	ug/L	NA	86	89	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	NA	
	Mean	ug/L	NA	44	46	NA	NA	NA	NA	
Extended Dry Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	NA	
	Mean	ug/L	NA	67	67	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	NA	
	Mean	ug/L	NA	39	39	NA	NA	NA	NA	
Average Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	ND	NA	NA	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	3 - 7	NA	NA	
	Mean	ug/L	NA	68	69	NA	6	NA	NA	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	4 - 8	NA	NA	
	Mean	ug/L	NA	43	43	NA	7	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	improved	NA	NA	Higher quality source (lower bromide, TDS, TOC) for customers receiving Freeport/Mokelumne blend
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	Zone 7 does not receive source water from this concept.

1. EBMUD is currently exploring a variety of options for conveying Freeport water to EBMUD customers. For the purposes of this analysis, it was assumed that water will be conveyed to the EBMUD distribution system via the Mokelumne Aqueduct.

2. Baseline water quality data is detailed in the Zone 7 section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Mokelumne-Mirant blend only, and do not reflect the effects of blending with Zone 7 supplies.

4. Values in this column represent the quality of the Mokelumne-Mirant blend prior to treatment by EBMUD. Note that Zone 7 does not receive untreated water from this concept (Zone 7 receives this water following treatment by EBMUD). Values are presented for reference with respect to CALFED ROD source water improvement targets.

Concept: Bay Area Use of Freeport Regional Project

Table G11-3 - Cost, Environmental and Implementation Score Card

	Concept	
Performance Measure/Objective	**Amount or Rating**	**Notes/Other**
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Operating costs for use of Freeport facilities and wheeling through EBMUD system would need to be determined by EBMUD. Conceptual-level intertie costs are estimated to be $24M ($2005). Operational costs have not been estimated. Zone 7 life-cycle costs
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	TBD[1]	Allocation of costs will not be performed as part of this study.
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the regulating station and intertie would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby) etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Storage of water from the Sacramento River in the Zone 7 aquifer could reduce groundwater salinity. Because Zone 7 utilizes some groundwater for drinking purposes, reduction of salinity would improve the groundwater quality, wastewater quality and increase water recycling opportunities. In addition, the provision of water directly to Zone 7 retailers could reduce a like amount of pumping from either the SWP or the groundwater basin. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential		
External Support	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
Consistency with Local and Regional Plans	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	1	Zone 7
Population Receiving Benefits	280,000 people	

1. To be determined in future studies.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

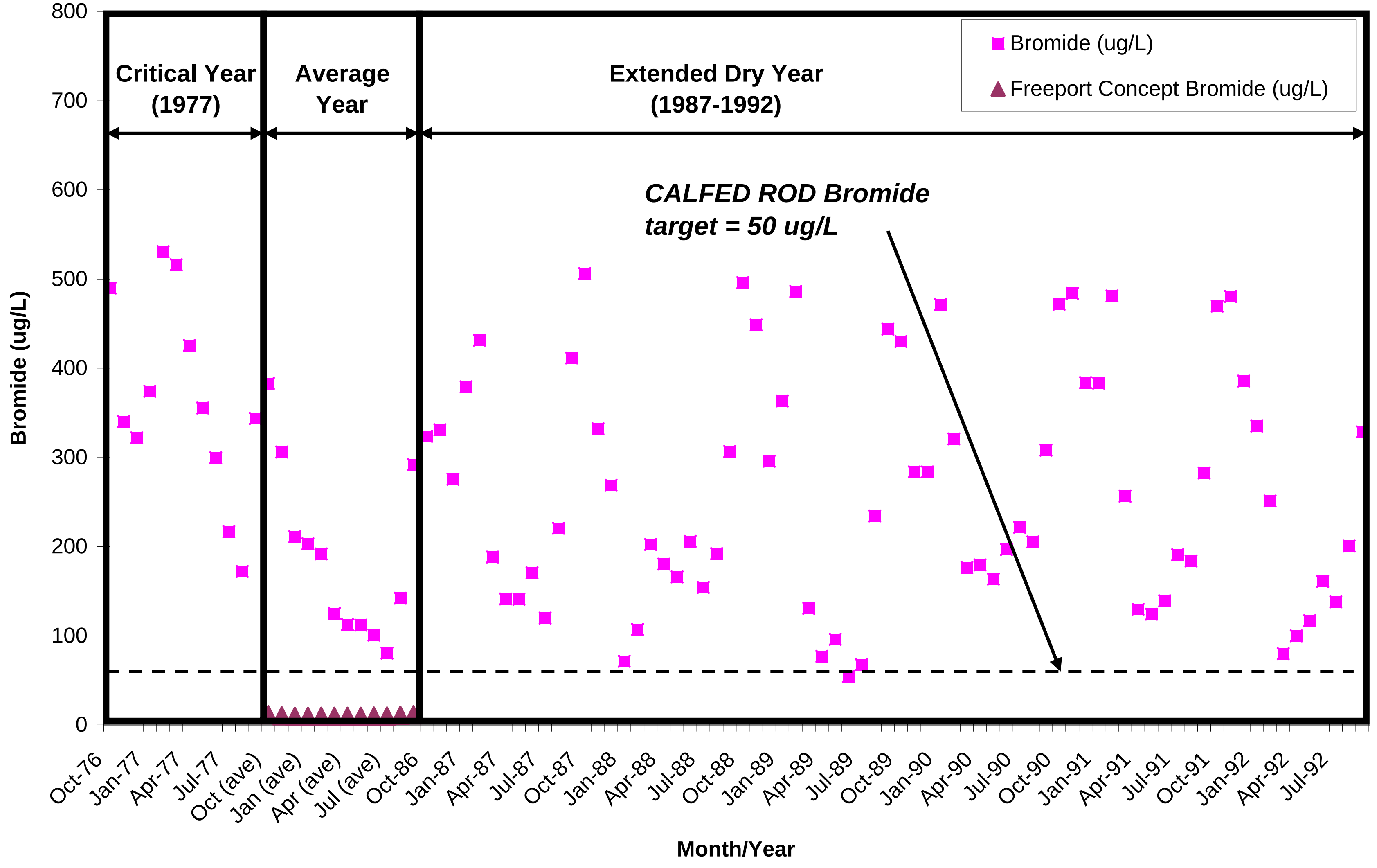
Concept: Bay Area Use of Freeport Regional Project

Table G11-4 - Environmental Score Card

Performance Measure/Objective	Concept Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Diversion of water during wet and average years of winter months (under high flow conditions) would not likely have adverse effects on Delta fisheries as less than one percent of flow would be diverted in any winter months, and the existing intake is equipped with a fish exclusion system. Additional studies would be required to confirm this assessment. Construction of concept facilities (regulating station and pipeline) would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the pipelines and regulating station have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Actual energy consumption not known. Operation of the existing facilities during the average to wet years would offset some amount of pumping of SBA facilities. The energy demand of concept facilities is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

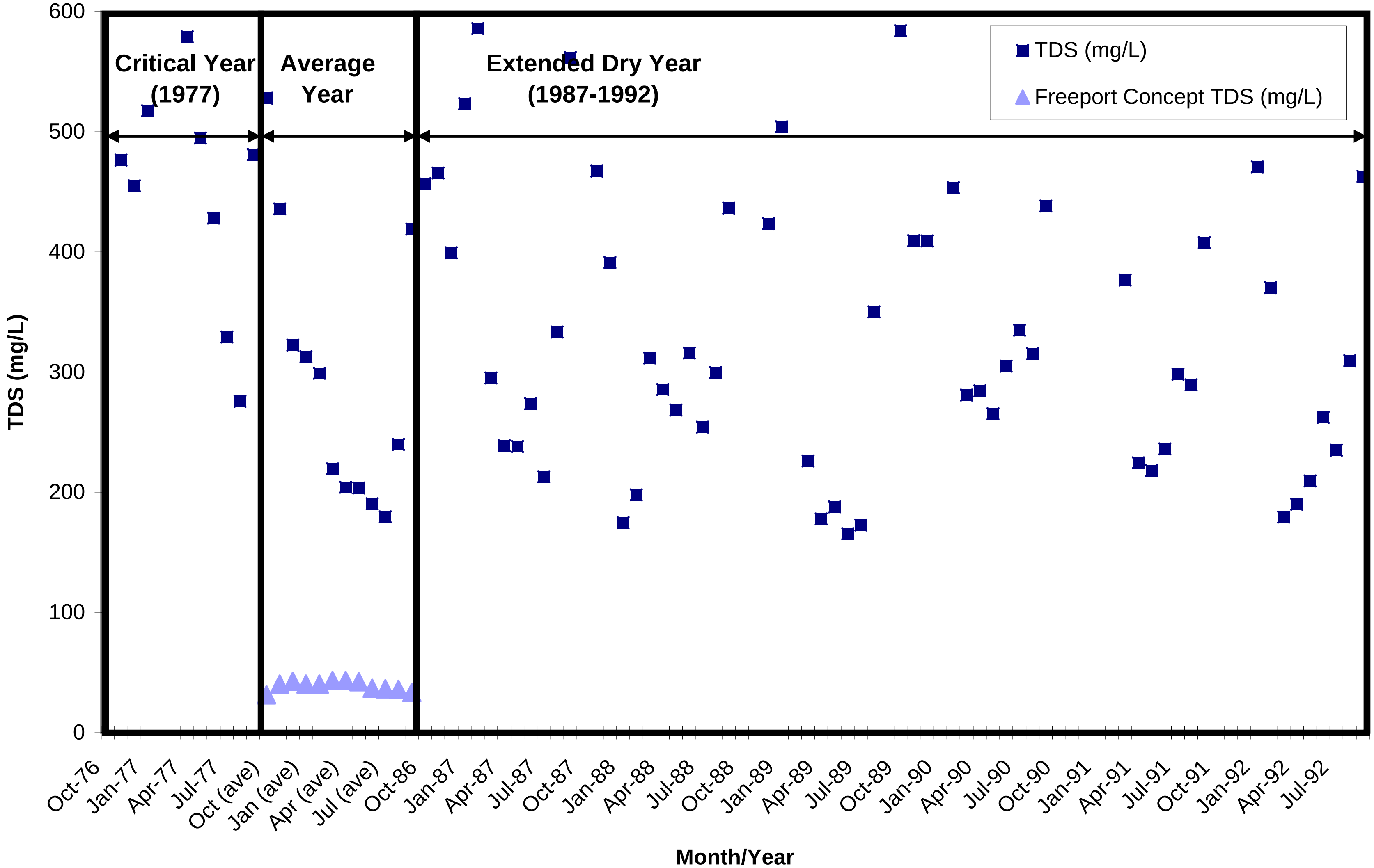
Concept: Bay Area Use of Freeport Regional Project

Comparison of Zone 7 Baseline Source Water Bromide with Freeport Concept Bromide



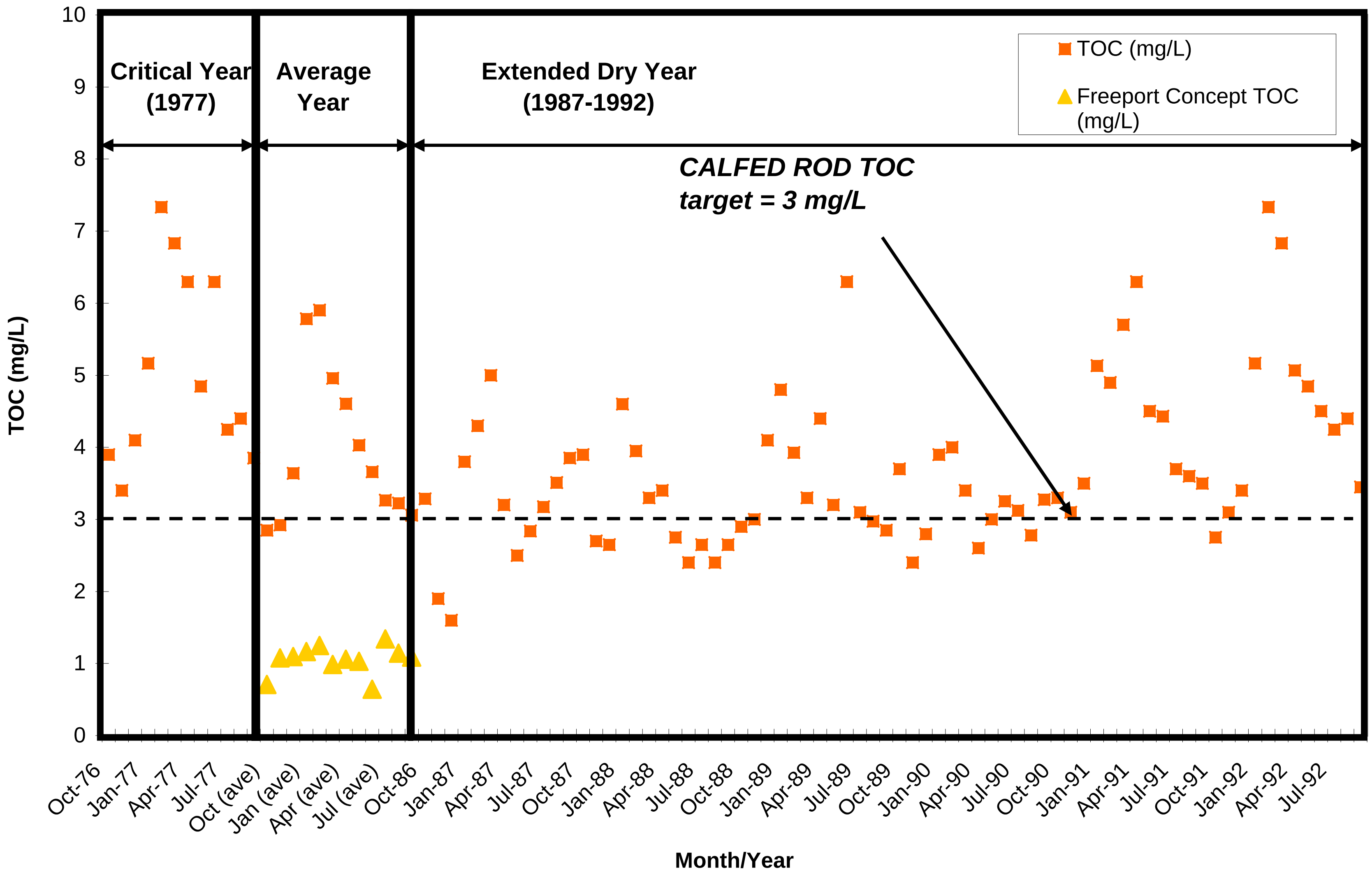
Concept: Bay Area Use of Freeport Regional Project

Comparison of Zone 7 Baseline Source Water TDS with Freeport Concept TDS



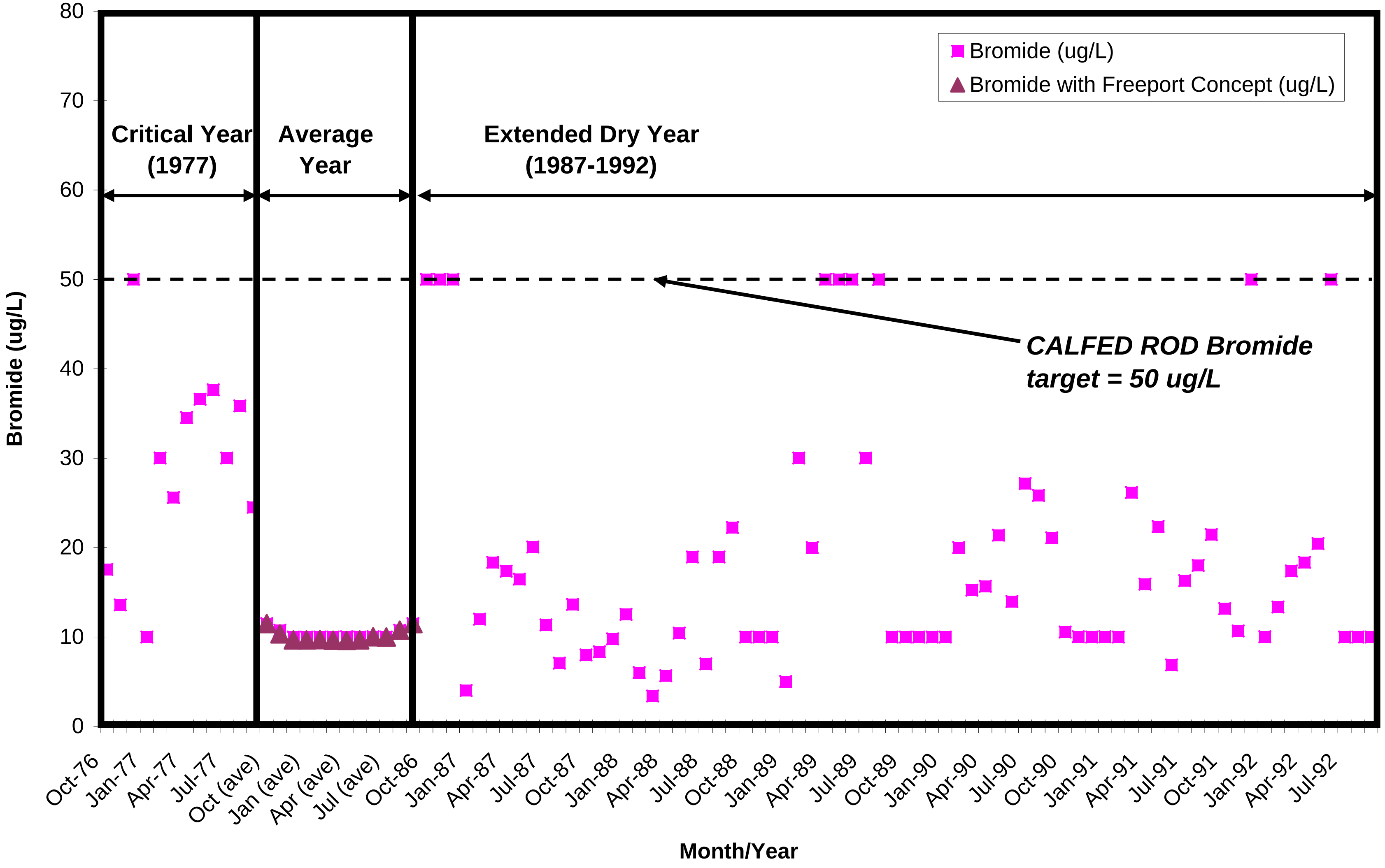
Concept: Bay Area Use of Freeport Regional Project

Comparison of Zone 7 Baseline Source Water TOC with Freeport Concept TOC



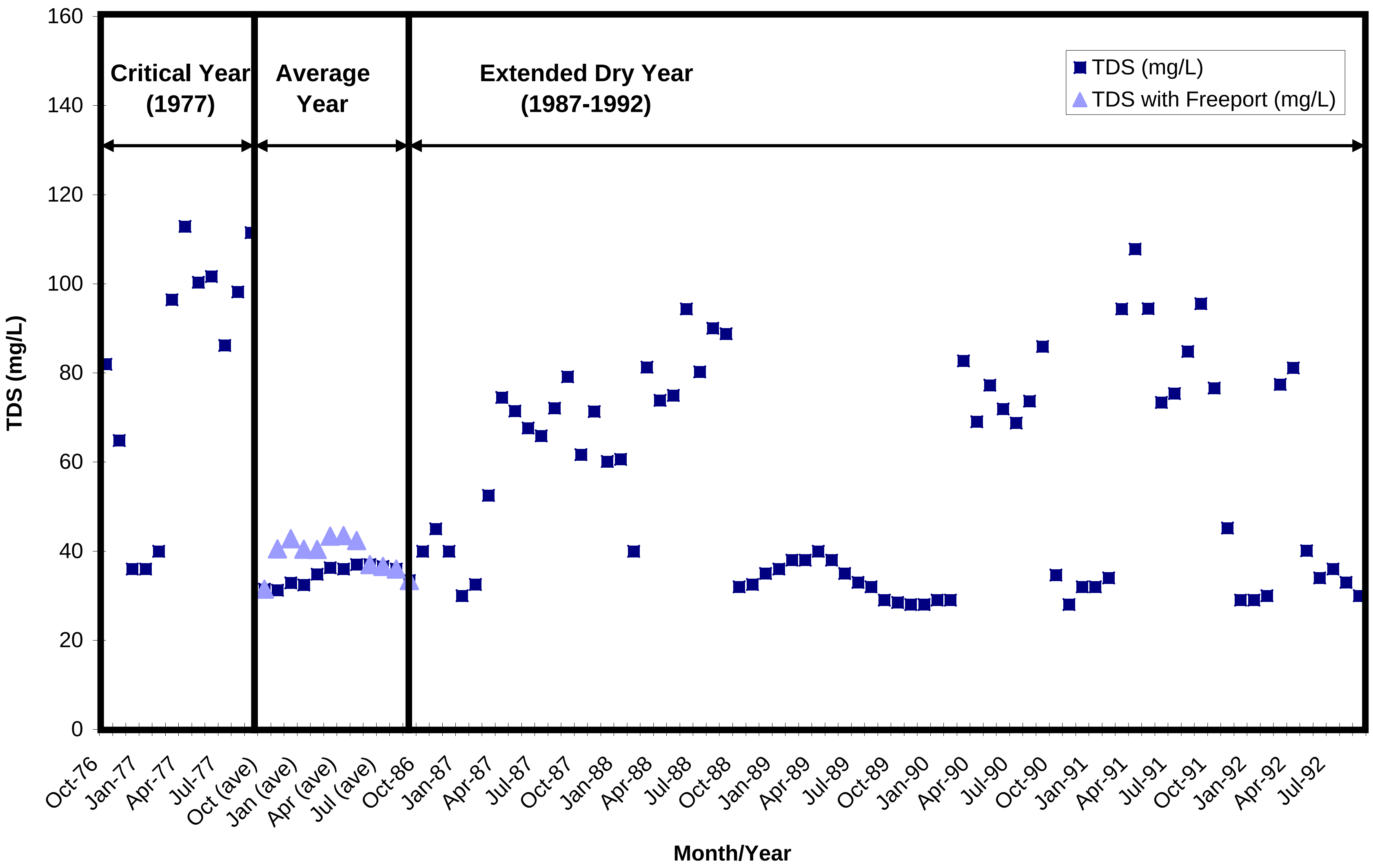
Concept: Bay Area Use of Freeport Regional Project

Comparison of EBMUD Baseline Source Water Bromide with Freeport Concept Bromide

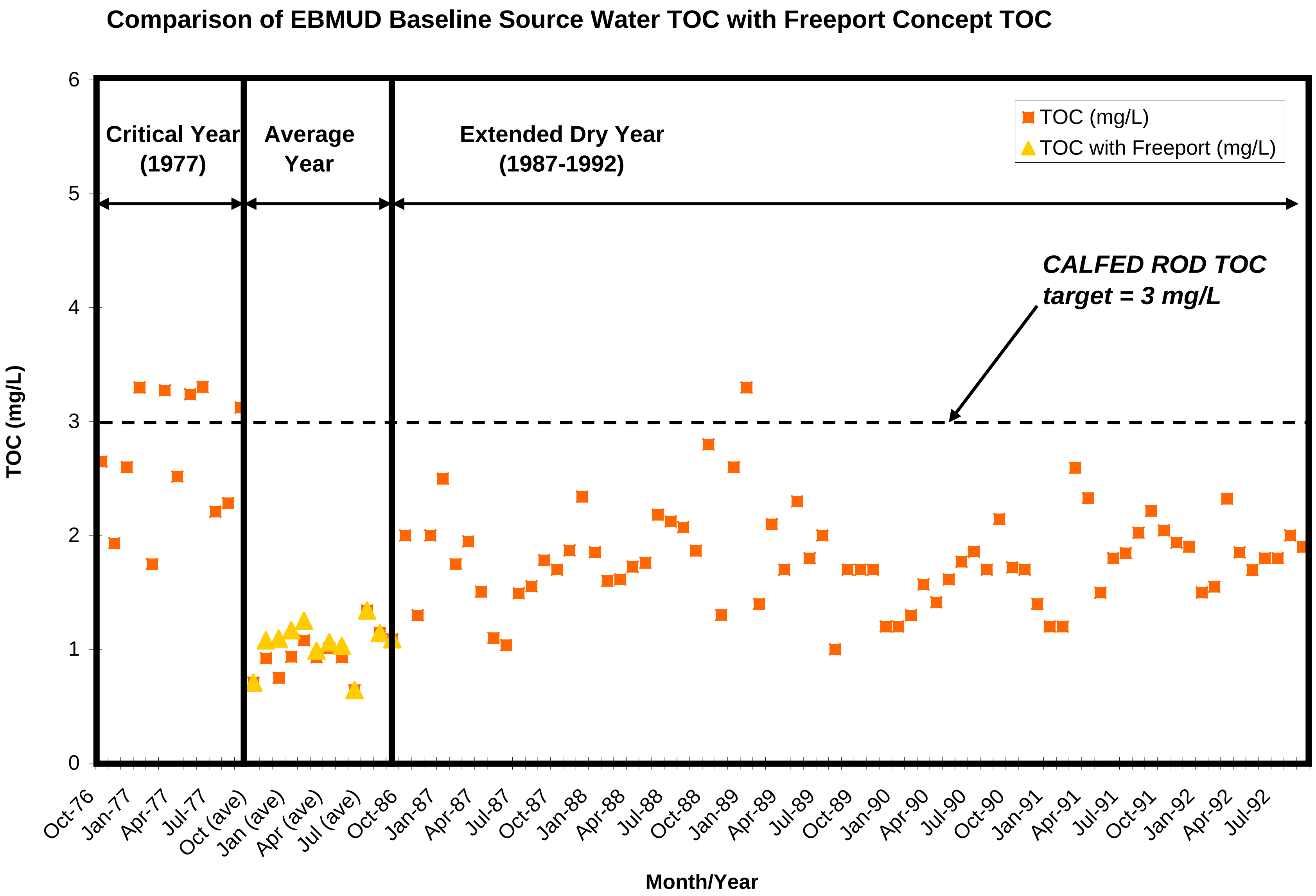


Concept: Bay Area Use of Freeport Regional Project

Comparison of EBMUD Baseline Source Water TDS with Freeport Concept TDS

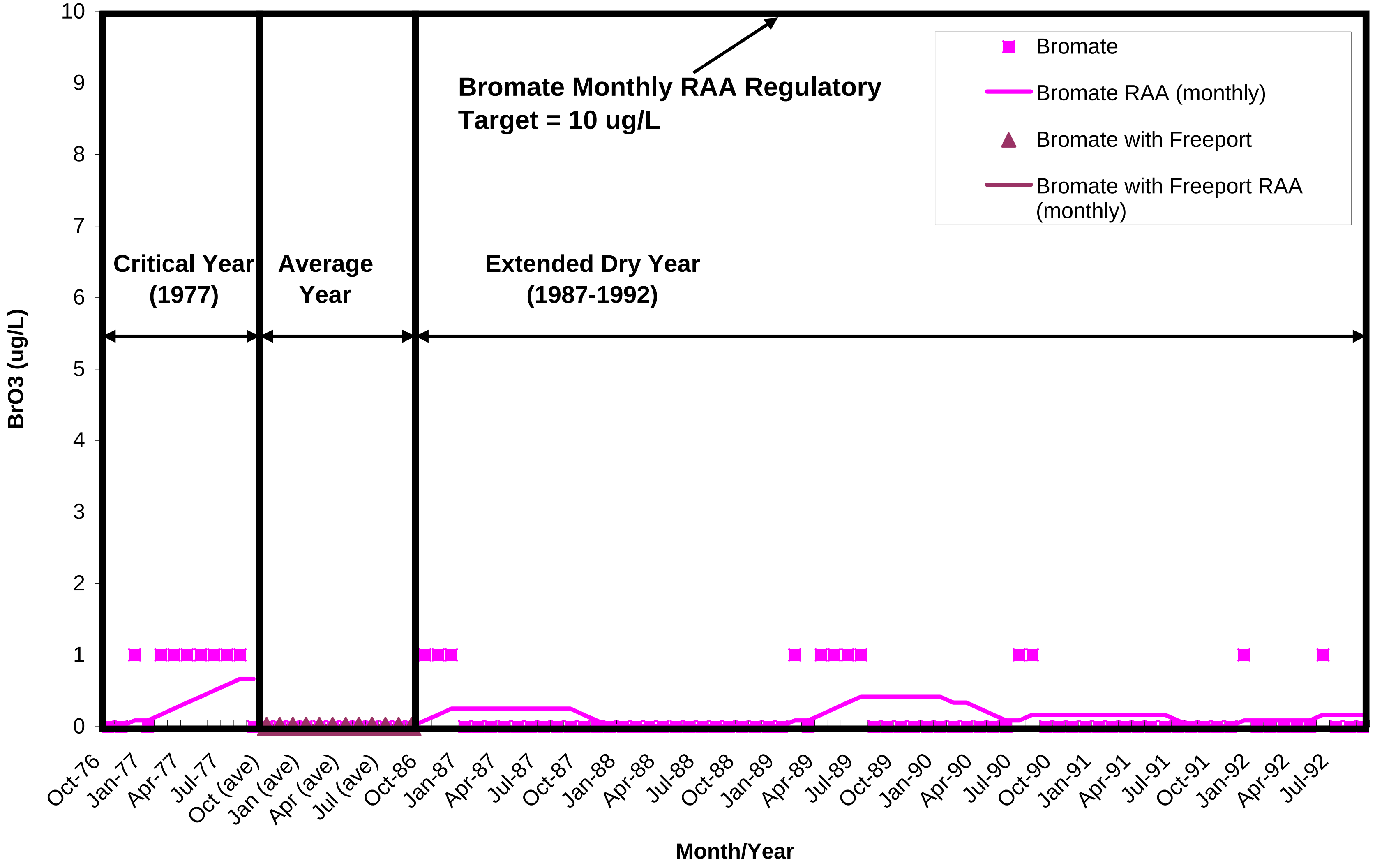


Concept: Bay Area Use of Freeport Regional Project


Comparison of EBMUD Baseline Source Water TOC with Freeport Concept TOC

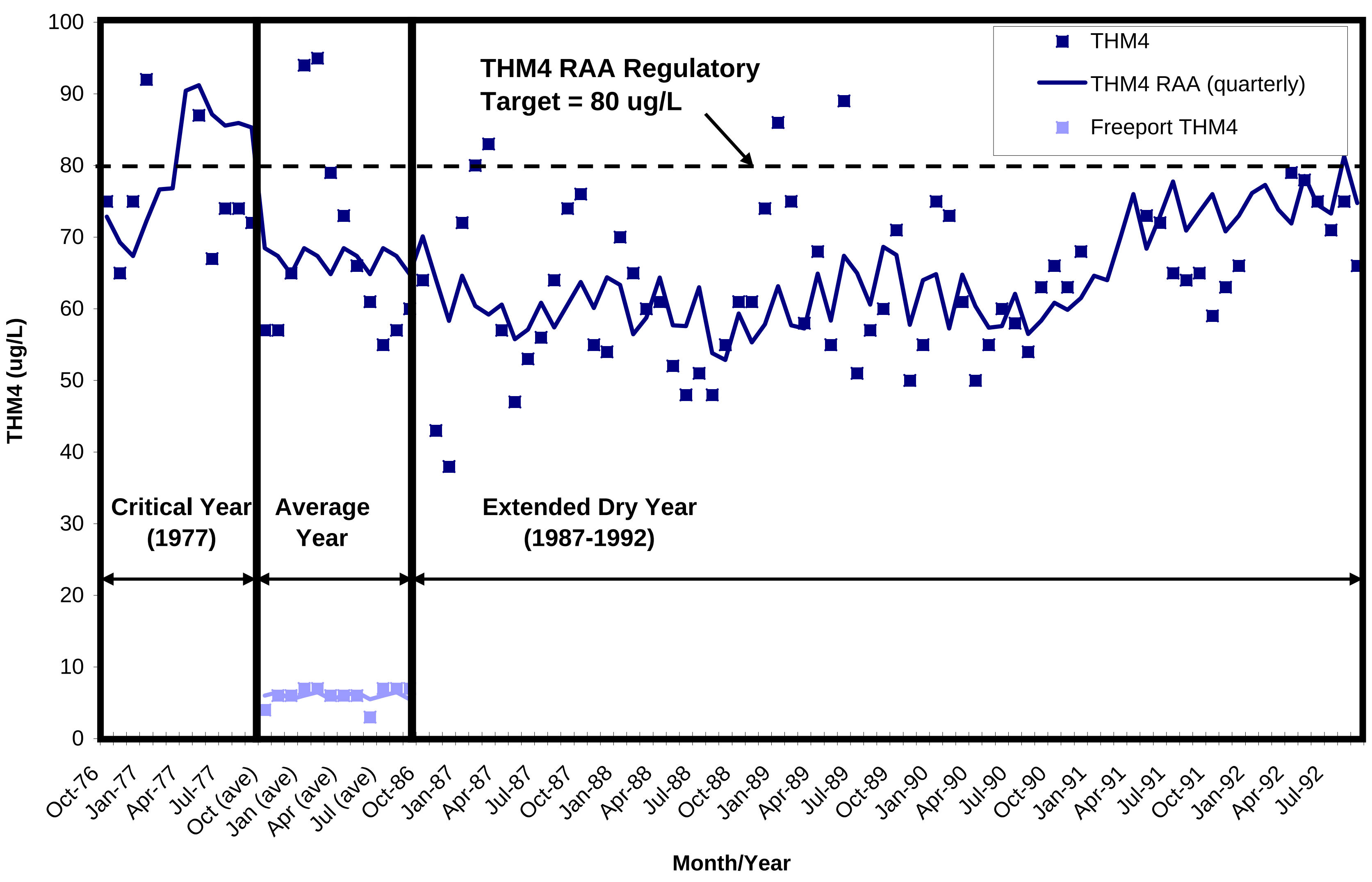
Concept: Bay Area Use of Freeport Regional Project

Comparison of EBMUD Baseline Bromate with Freeport Concept Bromate



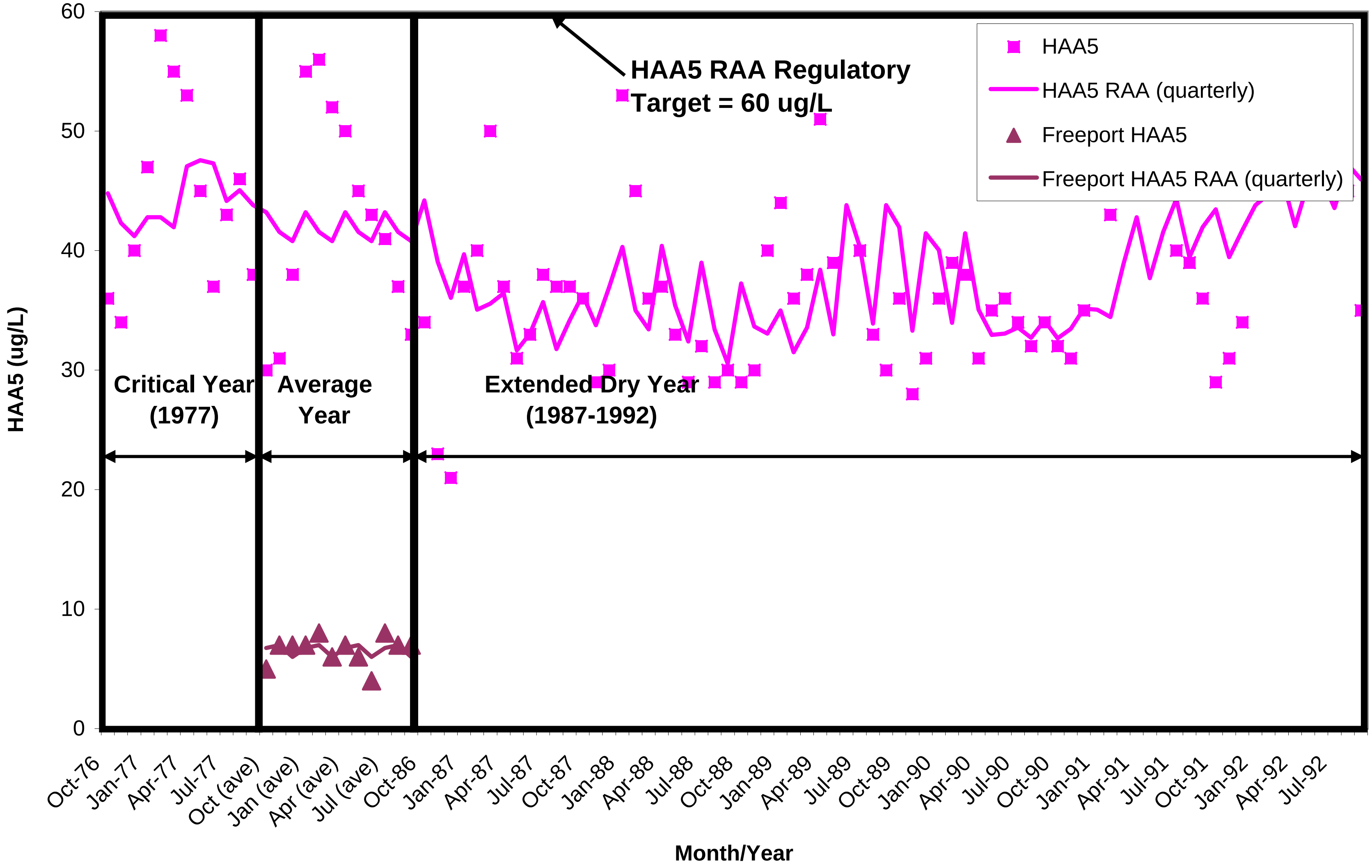
Concept: Bay Area Use of Freeport Regional Project

Comparison of Zone 7 SBA Baseline THM4 with Freeport Concept THM4



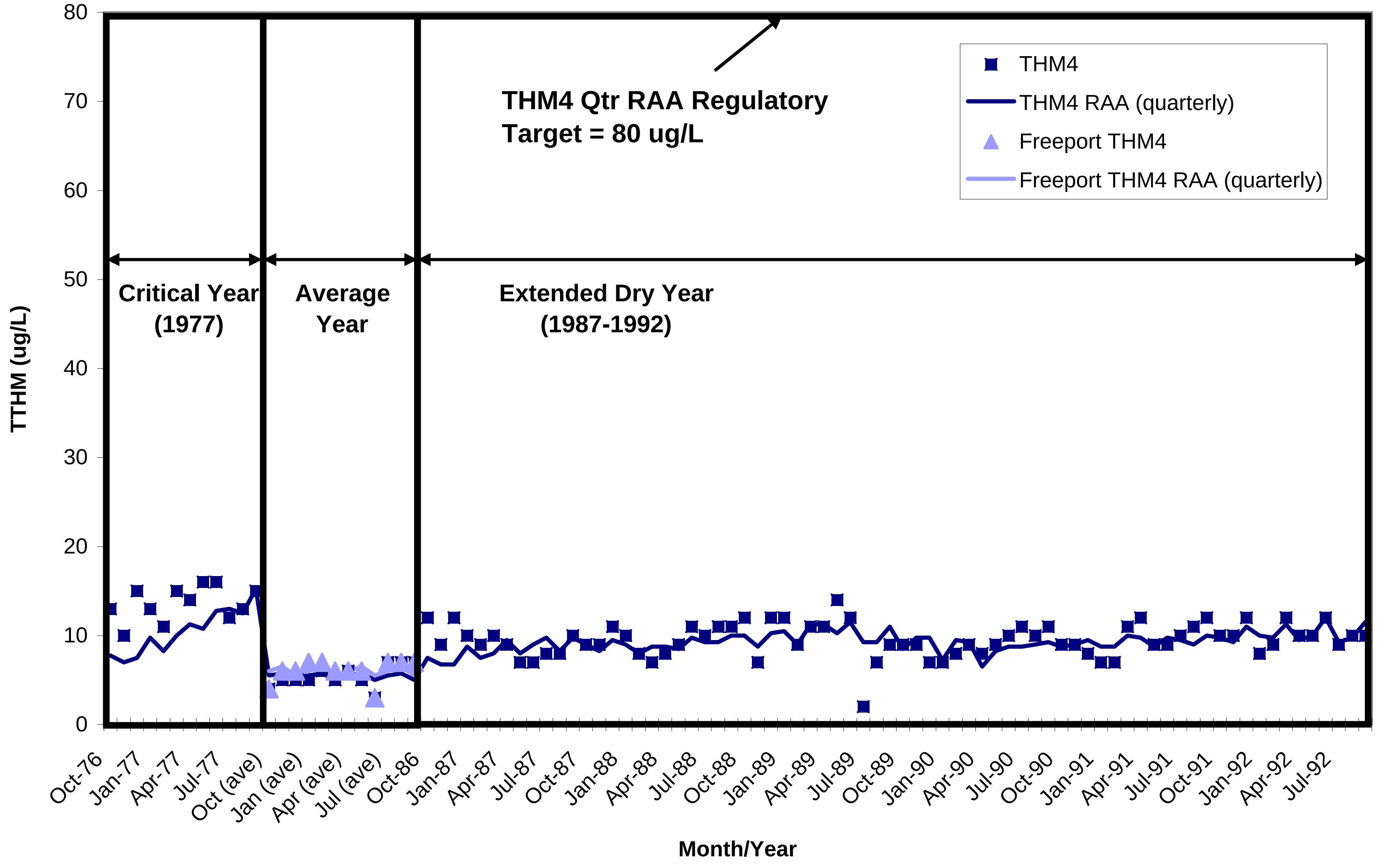
Concept: Bay Area Use of Freeport Regional Project

Comparison of Zone 7 Baseline HAA5 with Freeport Concept HAA5

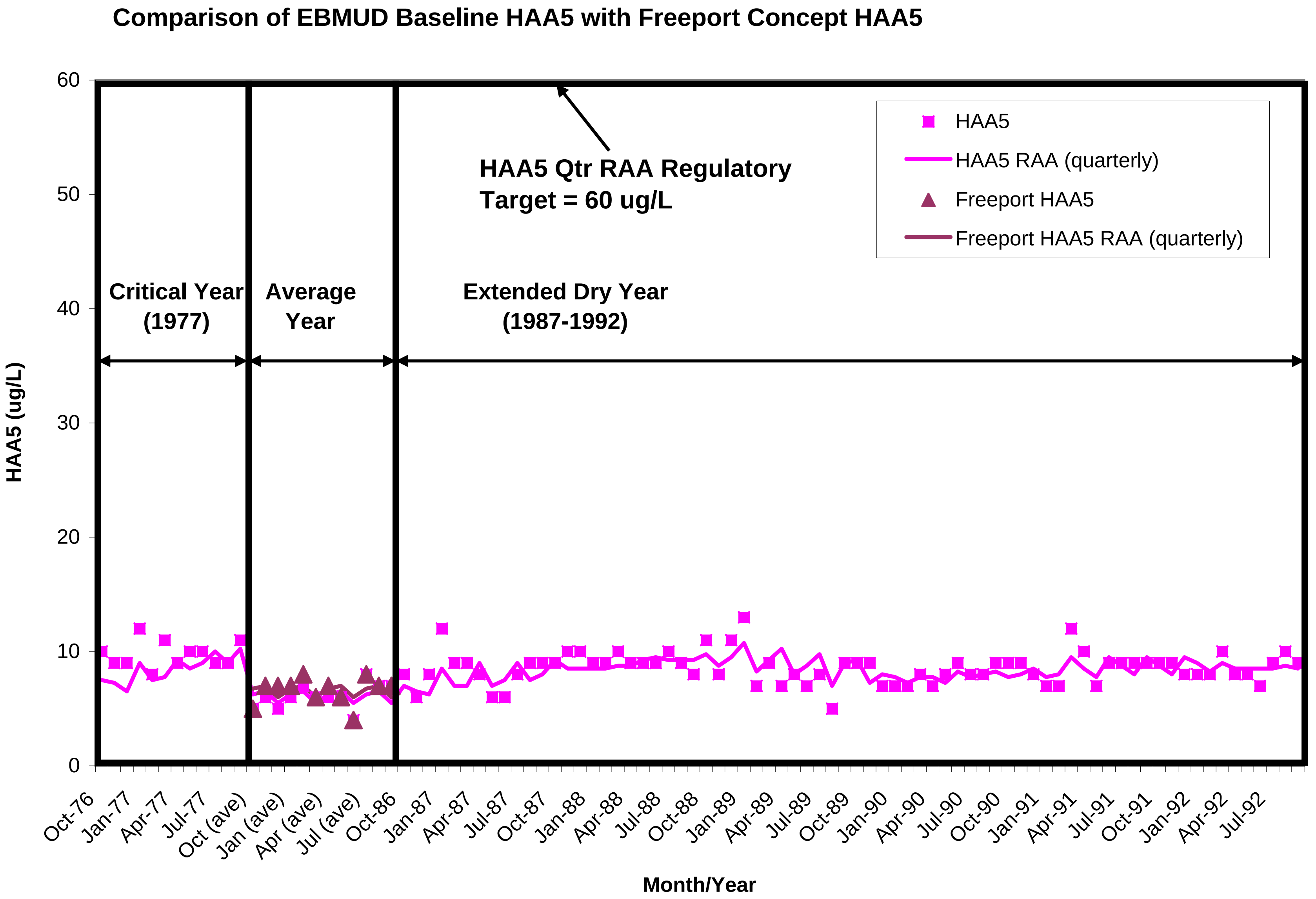


Concept: Bay Area Use of Freeport Regional Project

Comparison of EBMUD Baseline THM4 with Freeport Concept THM4



Concept: Bay Area Use of Freeport Regional Project



Portfolio Scorecards

G12 Maximize Water Quality Portfolio

G12 Example Portfolio: Maximize Water Quality

DESCRIPTION

The example Maximize Water Quality Portfolio includes four concepts: Los Vaqueros Reservoir Expansion, Calaveras Reservoir Expansion (water quality and supply reliability operational scenario), Mirant Desalination with Water Quality Element; and Enhanced Conservation.

In this example portfolio, both Los Vaqueros Reservoir Expansion and Calaveras Reservoir are used to provide water quality benefits to South Bay Aqueduct (SBA) customers Alameda County Water District (ACWD) and Santa Clara Valley Water District (SCVWD). In average years, Calaveras Reservoir water is used to offset South Bay Pumping Plant deliveries to meet ACWD and SCVWD demands. In dry years, Calaveras Reservoir and Los Vaqueros Reservoir are both used to meet dry-year supply.

Mirant Desalination with Water Quality Element is included to provide water to Zone 7 Water Agency (Zone 7) in average years for blending, via a new interconnection between East Bay Municipal Utility District (EBMUD) and Zone 7. Two other concepts were identified that have this same objective and would use the same intertie facilities: Near Bay Bridge Desalination with Water Quality Element and Bay Area Use of Freeport Regional Water Project. The Mirant Desalination with Water Quality Element concept was selected for illustrative purposes.

All seven participating agencies are anticipated to benefit from this portfolio. Additional information on each of the included concepts is provided below.

Maximize Water Quality Summary

Concepts Included:
- Los Vaqueros Reservoir Expansion
- Calaveras Reservoir Expansion (water quality and supply reliability)
- Mirant Desalination with Water Quality Element

Extended Dry Year Supply .... Up to 82,500 AFY

Average Year Water Quality Supply ....Up to 186,000 AFY

Cost ($2005)
Capital Cost...TBD in future studies
O&M Cost...TBD in future studies
Unit Cost ....TBD in future studies

Potential Owning Agency
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC, Zone 7

Potential Partners
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC(1), Zone 7

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

Los Vaqueros Reservoir Expansion

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability Program (BAWQ&SRP), the multipurpose operating scenario for a 500,000 AF reservoir with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the BAWQSRP as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are Contra Costa Water District (CCWD), Alameda County Water District (ACWD), Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

Calaveras Reservoir Expansion (water quality and supply reliability scenario)

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 AF up to 420,000 AF. An SFPUC study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. The BAWQSRP is evaluating potential facilities that would be required and operating scenarios that could be implemented if the reservoir were expanded to 420,000 AF. These scenarios and facilities are presented for illustrative purposes and do not represent future operating scenarios endorsed by the SFPUC nor do they represent a complete characterization of all facilities that may be required.

This example portfolio includes Calaveras Reservoir expansion with a water quality and dry-year supply reliability operational scenario. For this scenario, Hetch Hetchy water would be transferred into the expanded Calaveras Reservoir in average and wet years, and this water would be delivered, via a new connection, to the SBA to provide an average year water quality benefit for the downstream SBA contractors ACWD and SCVWD. This operating scenario could also provide dry-year supply reliability to the SFPUC regional system for SFPUC and its wholesale customers, as well as SCVWD, either via the existing SFPUC-SCVWD intertie or via the SBA. If deliveries are via the SBA, both SCVWD and ACWD would receive a dry-year water quality benefit. This concept provides 50,000 AFY for average year water quality and 41,000 AFY of dry-year supply reliability water. Potential dry-year supply beneficiaries are SFPUC (including retail and wholesale customers), ACWD and SCVWD. Potential average year water quality beneficiaries are SCVWD and ACWD.

❑ *Mirant Desalination with Water Quality Element*

This concept involves co-location of a 40 million gallons per day (MGD) desalination plant at either the Mirant Pittsburg Power Plant, in Pittsburg, or the Mirant Contra Costa Power Plant in Antioch, and conveyance of up to 25 MGD of desalinated water in average years to Zone 7 for water quality blending. This concept could potentially be implemented if the Regional Desalination Project, which is evaluating desalination plants at a number of different locations, were to develop a desalination plant at one of the Mirant sites. A 40 MGD facility is assumed, based on preliminary sizing evaluated for the Mirant site. The Mirant Desalination with Water Quality Element concept has not been evaluated by the Regional Desalination Project partners.

Deliveries to Zone 7 would be through EBMUD's distribution system in the San Ramon Valley, with a new interconnection sized to deliver up to 25 MGD to the Zone 7 system. Deliveries would be limited to lower demand periods (generally November through March, possibly extending into April and May) of average or wet years, when unused capacity is available in the EBMUD distribution system. The concept could provide up to 15,000 AFY of average year water quality with Zone 7 as the beneficiary. Although the concept would also have dry-year supply reliability benefits, these will be determined by Regional Desalination Project studies and have not been quantified.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-1 - Supply Reliability Score Card

Performance Measure/Objective	Baseline		Portfolio[1,5]		Baseline Plus Portfolio[1]		Notes/Other
	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	
Meet Demands							
Critical Drought							SBA contractors, CCWD, and SFPUC (details to be developed infuture studies) are beneficiaries of the Los Vaqueros Reservoir Expansion concept. SFPUC, SCVWD, BAWSCA (as wholesale customers of SFPUC), and ACWD are potential beneficiaries of the Calaveras Reservoir Expansion. Zone 7 will gain an average year water quality benefit from the Mirant with Water Quality Element concept. For Zone 7, no shortfalls have been projected for any hydrology, and yield is assumed to offset SBA supplies, resulting in no net increase in total supply. For all other agencies, additional supply from concepts is assumed to offset existing supplies in average years only.
ACWD Supply	20,600	AFY	Up to 51,269	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply[2]	137,800	AFY	Up to 41,000	AFY	Up to 178,800	AFY	
CCWD Supply	176,800	AFY	Up to 10,000	AFY	176,800	AFY	
EBMUD Supply	200,430	AFY	0	AFY	200,430	AFY	
SCVWD Supply	39,400	AFY	Up to 90,498	AFY	Up to 97,800	AFY	
SFPUC Supply[3]	157,000	AFY	Up to 41,000	AFY	Up to 198,000	AFY	
Zone 7 Supply (SWP)	38,900	AFY	0	AFY	38,900	AFY	
Total Supply[4]	633,130	AFY	Up to 110,767	AFY	Up to 743,897	AFY	
Extended Drought							
ACWD Supply	25,500	AFY	Up to 46,283	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply[3]	209,900	AFY	Up to 41,000	AFY	Up to 250,900	AFY	
CCWD Supply	170,800	AFY	Up to 9,400	AFY	Up to 176,800	AFY	
EBMUD Supply	216,420	AFY	0	AFY	216,420	AFY	
SCVWD Supply	63,000	AFY	Up to 67,735	AFY	Up to 97,800	AFY	
SFPUC Supply[3]	255,000	AFY	Up to 41,000	AFY	Up to 296,000	AFY	
Zone 7 Supply (SWP)	56,400	AFY	0	AFY	56,400	AFY	
Total Supply[4]	787,120	AFY	Up to 82,418	AFY	Up to 869,538	AFY	
Average Year							
ACWD Supply	42,700	AFY	Up to 50,000	AFY	42,700	AFY	
BAWSCA Agencies' Supply[3]	345,000	AFY	0	AFY	345,000	AFY	
CCWD Supply	139,400	AFY	0	AFY	139,400	AFY	
EBMUD Supply	255,590	AFY	0	AFY	255,590	AFY	
SCVWD Supply	97,800	AFY	Up to 50,000	AFY	97,800	AFY	
SFPUC Supply[3]	329,000	AFY	0	AFY	329,000	AFY	
Zone 7 Supply (SWP)	71,400	AFY	Up to 15,000	AFY	71,400	AFY	
Total Supply[4]	935,890	AFY	Up to 65,000	AFY	935,890	AFY	
Vulnerability							
ACWD	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - The Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors to potential Delta water quality problems. The expansions also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
BAWSCA Agencies[2]	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - Reduction in vulnerability resulting from reduced vulnerability of SCVWD and SFPUC systems.				
CCWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - The Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors (SCVWD) to potential Delta water quality problems.				
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.		No Effect on Vulnerability - Wheeling water through the EBMUD system will have no effect on EBMUD vulnerability.				
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - The Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors (SCVWD) to potential Delta water quality problems. The expansions also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP. The Calaveras Reservoir Expansion similarly reduces vulnerability of SCVWD to potential Delta water quality problems.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		No Effect on Vulnerability - Does not provide alternate source of supply in the event of a supply disruption. Effect of Los Vaqueros Reservoir Expansion on vulnerability will depend on operation and conveyance and will be determined in future studies.				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - The Mirant Desalination with Water Quality Element provides a separate connection point to Zone 7 if South Bay Aqueduct or Delta supply were interrupted. Availability limited to winter months of average years, during non-emergency conditions in EBMUD system. The Los Vaqueros Reservoir expansion reduces vulnerability to potential Delta water quality problems and provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - The Calaveras Reservoir Expansion would be locally controlled. The Mirant Desalination with Water Quality Element would require agreements with EBMUD and the RDP partners, who would control project operation. Under all institutional structures, CCWD would retain ownership and control of the watershed and operations of the Los Vaqueros Reservoir Expansion Project (CALFED, 2004). An ownership agreement would be developed outlining this. A governing entity would be formed to represent the project beneficiaries to: 1) collect payments from participants; 2) enter into an operating agreement with CCWD for operations, maintenance and replacement; and 3) enter into water service and exchange agreements to provide an agreed-upon level of water service.							

1. The Mirant Desalination with Water Quality Element concept was selected for inclusion in this analysis. The Bay Area Use of the Freeport Regional Water Project and Near Bay Bridge with Water Quality Element concepts would also provide average year water quality benefits to Zone 7, however, all three concepts require the same available capacity in the EBMUD system, and only one of the three concepts could be implemented at one time.

2. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.

3. SFPUC is a potential beneficiary for supply reliability only, and is not seeking water quality benefits.

4. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-2 - Public Health Protection Scorecard (Page 1 of 2)[1]

Performance Measure/Objective	Portfolio[2]		Baseline Plus Portfolio[2]		Notes
	Source Water	Treated Water	Source Water	Treated Water	
Variability for Treatment					
ACWD	Reduces Variability	NA	Reduces Variability	NA	The Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies[3]	NA	NA	NA	NA	BAWSCA receives treated supplies.
CCWD	No Effect on Variability	NA	No Effect on Variability	NA	The Los Vaqueros Reservoir Expansion has a minimal effect on variability for treatment.
EBMUD	Noe Effect on Variability	NA	Noe Effect on Variability	NA	The Mirant Desalination with Water Quality Element concept does not affect variability for treatment.
SCVWD	Reduces Variability	NA	Reduces Variability	NA	The Calaveras and Los Vaqueros Reservoir Expansion concepts and the East Bay Saline Groundwater Desalination concept will reduce variability of all parameters.
SFPUC	TBD[4]	NA	TBD[4]	NA	The Calaveras Reservoir Expansion has no effect on variability for treatment. The effect of the Los Vaqueros Reservoir Expansion concept on variability for treatment will depend on operating conditions and will be determined in future studies.
Zone 7	Reduces Variability	NA	Reduces Variability	NA	The Los Vaqueros Reservoir Expansion and Mirant Desalination with Water Quality Element concepts reduce variability of all parameters.
Total Dissolved Solids					
ACWD	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	The Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion concepts will reduce TDS.
BAWSCA Agencies[3]	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	The Calaveras Reservoir Expansion, Los Vaqueros Reservoir Expansion, and East Bay Saline Groundwater Desalination concepts will reduce TDS.
CCWD	No Effect on TDS	No Effect on TDS	No Effect on TDS	No Effect on TDS	The Los Vaqueros Reservoir Expansion will have a minimal effect on TDS.
EBMUD	No Effect on TDS	No Effect on TDS	No Effect on TDS	No Effect on TDS	The Mirant Desalination with Water Quality Element concept will have a minimal effect onTDS.
SCVWD	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	The Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion concepts, and the East Bay Saline Groundwater Desalination concept will reduce TDS.
SFPUC	TBD[4]	TBD[4]	TBD[4]	TBD[4]	The Calaveras Reservoir Expansion will have no effect on TDS. The effect of the Los Vaqueros Reservoir Expansion concept on TDS will depend on operating conditions and will be determined in future studies.
Zone 7	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	The Los Vaqueros Reservoir Expansion and Mirant Desalination with Water Quality Element concepts will reduce TDS.
Disinfection By-Products					
ACWD	NA	Reduces DBPs	NA	Reduces DBPs	The Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion concepts will result in DBP reductions.
BAWSCA Agencies[3]	NA	Reduces DBPs	NA	Reduces DBPs	The Calaveras Reservoir Expansion, Los Vaqueros Reservoir Expansion, and East Bay Saline Groundwater Desalination concepts will result in DBP reductions.
CCWD	NA	No Effect on DBPs	NA	No Effect on DBPs	The Los Vaqueros Reservoir Expansion will have a minimal effect on potential for DBP production.
EBMUD	NA	No Effect on DBPs	NA	No Effect on DBPs	The Mirant Desalination with Water Quality Element will have a minimal effect on DBP production.
SCVWD	NA	Reduces DBPs	NA	Reduces DBPs	The Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion concepts, and the East Bay Saline Groundwater Desalination concept will result in DBP reductions.
SFPUC	NA	TBD[4]	NA	TBD[4]	The Calaveras Reservoir Expansion will have no effect on potential for DBP production. The effect of the Los Vaqueros Reservoir Expansion concept on DBP production will depend on operating conditions and will be determined in future studies.
Zone 7	NA	Reduces DBPs	NA	Reduces DBPs	The Los Vaqueros Reservoir Expansion and Mirant Desalination with Water Quality Element concepts will result in DBP reductions.

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.

2. The Mirant Desalination with Water Quality Element concept was selected for inclusion in this analysis. The The Bay Area Use of the Freeport Regional Water Project and Near Bay Bridge with Water Quality Element concepts would also provide average year water quality benefits to Zone 7, however, all three concepts require the same available capacity in the EBMUD system, and only one of the three concepts could be implemented at one time.

3. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.

4. To be determined in future studies.

Table G12-2 - Public Health Protection Scorecard (Page 2 of 2) [1]

Performance Measure/Objective	Portfolio[2]		Baseline Plus Portfolio[2]		Notes
	Source Water	Treated Water	Source Water	Treated Water	
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	Improves T&O	NA	Improves T&O	The Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion concepts will result in improved overall water quality and improved taste and odor.
BAWSCA Agencies[3]	NA	Improves T&O	NA	Improves T&O	The Calaveras Reservoir Expansion, Los Vaqueros Reservoir Expansion, and East Bay Saline Groundwater Desalination concepts will result in improved overall water quality and improved taste and odor.
CCWD	NA	No Effect on T&O	NA	No Effect on T&O	The Los Vaqueros Reservoir Expansion will have a minimal effect on overall water quality and is not expected to significantly affect taste and odor.
EBMUD	NA	No Effect on T&O	NA	No Effect on T&O	The Mirant Desalination with Water Quality Element concept will have a minimal effect on water quality and taste and odor.
SCVWD	NA	Improves T&O	NA	Improves T&O	The Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion concepts, and the East Bay Saline Groundwater Desalination concept will result in improved overall water quality and improved taste and odor.
SFPUC	NA	TBD[4]	NA	TBD[4]	The Calaveras Reservoir Expansion will have no effect on overall water quality and is not expected to significantly affect taste and odor. The effect of the Los Vaqueros Reservoir Expansion concept on taste and odor will depend on operating conditions and will be determined in future studies.
Zone 7	NA	Improves T&O	NA	Improves T&O	The Los Vaqueros Reservoir Expansion and Mirant Desalination with Water Quality Element concepts will result in improved overall water quality and improved taste and odor.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the Los Vaqueros or Calaveras Reservoir Expansions.
BAWSCA Agencies[3]	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the Los Vaqueros or Calaveras Reservoir Expansions, or East Bay Saline Groundwater Desalination.
CCWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the Los Vaqueros Reservoir Expansion.
EBMUD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the Mirant Desalination with Water Quality Element concept.
SCVWD	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the Los Vaqueros or Calaveras Reservoir Expansions or the East Bay Saline Groundwater Desalination concept.
SFPUC	NA	NA	TBD[4]	TBD[4]	The potential for degradation due to known impacts is not projected to increase with the Calaveras Reservoir Expansion. The effect of the Los Vaqueros Reservoir Expansion concept on potential for degradation will depend on operating conditions and will be determined in future studies.
Zone 7	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the Los Vaqueros Reservoir Expansion or the Mirant Desalination with Water Quality Element concept.
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	TBD[4]	TBD[4]	TBD[4]	TBD[4]	Emerging contaminants such as algal biotoxins may be a factor with the Calaveras Reservoir Expansion (increased potential for algal blooms in the expanded reservoir). Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.
BAWSCA Agencies[3]	TBD[4]	TBD[4]	TBD[4]	TBD[4]	Emerging contaminants such as algal biotoxins may be a factor with the Calaveras Reservoir Expansion (increased potential for algal blooms in the expanded reservoir). Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.
CCWD	TBD[4]	TBD[4]	TBD[4]	TBD[4]	Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.
EBMUD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
SCVWD	TBD[4]	TBD[4]	TBD[4]	TBD[4]	Emerging contaminants such as algal biotoxins may be a factor with the Calaveras Reservoir Expansion (increased potential for algal blooms in the expanded reservoir). Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.
SFPUC	TBD[4]	TBD[4]	TBD[4]	TBD[4]	Emerging contaminants such as algal biotoxins may be a factor with the Calaveras Reservoir Expansion (increased potential for algal blooms in the expanded reservoir). Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.
Zone 7	TBD[4]	TBD[4]	TBD[4]	TBD[4]	Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. The Mirant Desalination with Water Quality Element concept was selected for inclusion in this analysis. The The Bay Area Use of the Freeport Regional Water Project and Near Bay Bridge with Water Quality Element concepts would also provide average year water quality benefits to Zone 7, however, all three concepts require the same available capacity in the EBMUD system, and only one of the three concepts could be implemented at one time.
3. BAWSCA Agencies are potential beneficiaries as wholesale SFPUC customers.
4. To be determined in future studies.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-2a - Public Health Protection Score Card by Agency

Agency: ACWD

			Agency Baseline			Agency Baseline			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**Agency Baseline Plus Los Vaqueros and Calaveras Expansion Source Water**	**Agency Baseline Plus Los Vaqueros and Calaveras Expansion Treated Water (WTP1)**	**Agency Baseline Plus Los Vaqueros and Calaveras Expansion Treated Water (WTP2)**	**Notes**
Supply Quantity									
Critical Year		AFY	20,600			42,700			
Extended Dry Year		AFY	25,500			42,700			
Average Year		AFY	42,700			42,700			
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	0.07 - 0.10	0.05 - 0.07	0.06 - 0.09	
	Mean	mg/L	0.37	0.28	0.33	0.08	0.05	0.07	
TOC	Range	mg/L	3.4 - 7.3	2.9 - 6.4	2.3 - 5.5	2.8 - 3.2	2.4 - 2.7	1.9 - 2.2	
	Mean	mg/L	5.06	4.38	3.7	3.0	2.5	2.0	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	less variable	less variable	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.41	0.04 - 0.47	0.05 - 0.15	0.03 - 0.11	0.04 - 0.17	
	Mean	mg/L	0.26	0.20	0.23	0.11	0.08	0.10	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	2.3 - 6.1	1.9 - 5.3	1.5 - 4.5	
	Mean	mg/L	3.7	3.17	2.6	3.2	2.7	2.2	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	less variable	less variable	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	0.07 - 0.10	0.05 - 0.07	0.06 - 0.09	
	Mean	mg/L	0.19	0.14	0.17	0.08	0.05	0.07	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	2.3 - 6.1	2.4 - 2.7	1.9 - 2.2	
	Mean	mg/L	4.8	3.4	2.8	3.2	2.5	2.0	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	less variable	less variable	pH is somewhat variable but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	101 - 143	124 - 166	133 - 174	
	Mean	mg/L	507	529	561	132	155	186	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	109 - 249	131 - 272	140 - 281	
	Mean	mg/L	384	406	438	195	217	249	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	101 - 143	124 - 166	133 - 174	
	Mean	mg/L	296	319	350	132	155	186	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND - ND	2 - 6	NA	ND - ND	1 - 1	
	Mean	mg/L	NA	ND	4	NA	ND	1	
THM4	Range	mg/L	NA	82 - 153	26 - 42	NA	60 - 69	19 - 21	
	Mean	mg/L	NA	110	33	NA	63	20	
HAA5	Range	mg/L	NA	47 - 75	16 - 21	NA	50 - 53	17 - 18	
	Mean	mg/L	NA	61	19	NA	52	18	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND - ND	1 - 5	NA	ND - ND	1 - 2	
	Mean	mg/L	NA	ND	3	NA	ND	1	
THM4	Range	mg/L	NA	50 - 142	16 - 38	NA	52 - 105	17 - 64	
	Mean	mg/L	NA	83	26	NA	68	22	
HAA5	Range	mg/L	NA	22 - 92	11 - 26	NA	34 - 90	15 - 26	
	Mean	mg/L	NA	52	17	NA	52	18	
Average Year									
Bromate	Range	mg/L	NA	ND - ND	1 - 4	NA	ND - ND	1 - 1	
	Mean	mg/L	NA	ND	2	NA	ND	1	
THM4	Range	mg/L	NA	68 - 116	21 - 33	NA	50 - 64	19 - 21	
	Mean	mg/L	NA	85	26	NA	59	20	
HAA5	Range	mg/L	NA	41 - 74	14 - 22	NA	51 - 63	17 - 18	
	Mean	mg/L	NA	57	19	NA	55	18	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	minimal	NA	NA	

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-2b - Public Health Protection Score Card by Agency

Agency: SCVWD

			Agency Baseline		**Baseline Plus Portfolio**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**Los Vaqueros and Calaveras Expansions plus Agency Baseline Source Water**	**Los Vaqueros and Calaveras Expansions plus Agency Baseline Treated Water**	**Notes**
Supply Quantity							
Critical Year		AFY	39,400		97,800		
Extended Dry Year		AFY	63,000		97,800		
Average Year		AFY	97,800		97,800		
Variability for Treatment							
Critical Year							
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	0.07 - 0.10	0.06 - 0.09	
	Mean	mg/L	0.37	0.33	0.08	0.06	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	2.8 - 3.2	2.5 - 2.9	
	Mean	mg/L	5.1	3.9	3.0	2.7	
pH	Qual		somewhat variable	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year							
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	0.05 - 0.15	0.04 - 0.13	
	Mean	mg/L	0.26	0.24	0.11	0.09	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	2.3 - 6.1	2.1 - 5.6	
	Mean	mg/L	3.7	2.7	3.2	2.9	
pH	Qual		somewhat variable	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	less variable	Temperature variations are seasonal
Average Year							
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	0.07 - 0.10	0.06 - 0.09	
	Mean	mg/L	0.19	0.17	0.08	0.06	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	2.3 - 6.1	2.5 - 2.9	
	Mean	mg/L	4.0	3.0	3.2	2.7	
pH	Qual		somewhat variable	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids							
Critical Year	Range	mg/L	276 - 704	296 - 724	101 - 143	121 - 163	
	Mean	mg/L	507	527	132	152	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	109 - 249	128 - 269	
	Mean	mg/L	384	404	195	215	
Average Year	Range	mg/L	180 - 528	199 - 548	101 - 143	121 - 163	
	Mean	mg/L	296	316	132	152	
Minimize Disinfection Byproducts							
Critical Year							
Bromate	Range	mg/L	NA	3 - 9	NA	ND - 1	
	Mean	mg/L	NA	6	NA	0.2	
THM4	Range	mg/L	NA	27 - 44	NA	26 - 29	
	Mean	mg/L	NA	34	NA	27	
HAA5	Range	mg/L	NA	11 - 14	NA	15 - 16	
	Mean	mg/L	NA	13	NA	16	
Extended Dry Year							
Bromate	Range	mg/L	NA	1 - 8	NA	0 - 1	
	Mean	mg/L	NA	4	NA	1	
THM4	Range	mg/L	NA	16 - 40	NA	17 - 38	
	Mean	mg/L	NA	27	NA	29	
HAA5	Range	mg/L	NA	7 - 18	NA	13 - 22	
	Mean	mg/L	NA	11	NA	15	
Average Year							
Bromate	Range	mg/L	NA	1 - 6	NA	ND - 1	
	Mean	mg/L	NA	3	NA	0.2	
THM4	Range	mg/L	NA	22 - 34	NA	26 - 29	
	Mean	mg/L	NA	27	NA	27	
HAA5	Range	mg/L	NA	9 - 15	NA	15 - 16	
	Mean	mg/L	NA	12	NA	16	
Minimize Taste and Odor							
Source of water	Qual		NA	NA	quality	quality	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		moderate	NA	minimal likelihood	NA	

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-2c - Public Health Protection Score Card by Agency

Agency: EBMUD

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline[1]		Baseline Plus Portfolio[2,3,4]		Notes
			EBMUD Source Water	EBMUD Treated Water	Mirant with Water Quality Element plus Agency Baseline Source Water	Mirant with Water Quality Element plus Agency Baseline Treated Water	
Supply Quantity							
Critical Year		AFY	200,430		200,430		
Extended Dry Year		AFY	216,420		216,420		
Average Year		AFY	255,590		255,590		
Minimize Variability for Treatment							
Critical Year							
Bromide	Range	mg/L	0.01 - 0.05	0.01 - 0.04	NA	NA	
	Mean	mg/L	0.03	0.02	NA	NA	
TOC	Range	mg/L	1.8 - 3.3	1.1 - 2.4	NA	NA	
	Mean	mg/L	2.7	1.9	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	Temperature variations are seasonal
Extended Dry Year							
Bromide	Range	mg/L	ND - 0.05	0.00 - 0.05	NA	NA	
	Mean	mg/L	0.02	0.02	NA	NA	
TOC	Range	mg/L	1.0 - 3.3	0.5 - 2.4	NA	NA	
	Mean	mg/L	1.8	1.1	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	Temperature variations are seasonal
Average Year							
Bromide	Range	mg/L	0.01 - 0.01	0.01 - 0.01	0.01 - 0.01	0.01 - 0.01	
	Mean	mg/L	0.01	0.01	0.01	0.01	
TOC	Range	mg/L	0.6 - 1.3	0.1 - 0.7	0.6 - 1.3	0.1 - 0.7	
	Mean	mg/L	1.0	0.4	0.9	0.4	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	variable	variable	Temperature variations are seasonal
Minimize Total Dissolved Solids							
Critical Year	Range	mg/L	36 - 113	56 - 133	NA	NA	
	Mean	mg/L	80	100	NA	NA	
Extended Dry Year	Range	mg/L	28 - 108	48 - 128	NA	NA	
	Mean	mg/L	55	75	NA	NA	
Average Year	Range	mg/L	31 - 37	51 - 57	32 - 39	51 - 59	
	Mean	mg/L	35	54	36	55	
Minimize Disinfection Byproducts							
Critical Year							
Bromate	Range	ug/L	NA	ND - 1	NA	NA	
	Mean	ug/L	NA	1	NA	NA	
THM4	Range	ug/L	NA	10 - 16	NA	NA	
	Mean	ug/L	NA	14	NA	NA	
HAA5	Range	ug/L	NA	8 - 12	NA	NA	
	Mean	ug/L	NA	10	NA	NA	
Extended Dry Year							
Bromate	Range	ug/L	NA	ND - 1	NA	NA	
	Mean	ug/L	NA	ND	NA	NA	
THM4	Range	ug/L	NA	2 - 14	NA	NA	
	Mean	ug/L	NA	10	NA	NA	
HAA5	Range	ug/L	NA	5 - 13	NA	NA	
	Mean	ug/L	NA	9	NA	NA	
Average Year							
Bromate	Range	ug/L	NA	ND	NA	ND - ND	
	Mean	ug/L	NA	ND	NA	ND	
THM4	Range	ug/L	NA	3 - 7	NA	3 - 7	
	Mean	ug/L	NA	5	NA	5	
HAA5	Range	ug/L	NA	4 - 8	NA	4 - 8	
	Mean	ug/L	NA	6	NA	6	
Minimize Taste and Odor							
Source of water	Qual		NA	NA	NA	degraded overall quality	Lower quality source (higher TDS, bromide)
Algal blooms	Qual		minimal	NA	no change	NA	TOC is not substantially increased, temperature is not greatly affected

1. Baseline water quality data was collected from EBMUD and is detailed in the EBMUD section of the Water Supply and Water Quality Baseline Technical Memorandum.

2. The Mirant Desalination with Water Quality Element concept was selected for inclusion in this analysis. The The Bay Area Use of the Freeport Regional Water Project and Near Bay Bridge with Water Quality Element concepts would also provide average year water quality benefits to Zone 7, however, all three concepts require the same available capacity in the EBMUD system, and only one of the three concepts could be implemented at one time.

3. For the purposes of this analysis, it was assumed that water will be conveyed to the EBMUD distribution system via the Mokelumne Aqueduct. EBMUD water quality presentec in the Baseline Plus Concept columns reflect blending of projected Mirant with Water Quality Element concept deliveries with projected Mokelumne deliveries. In actuality, water quality impacts of this concept may be isolated to the San Ramon Valley system.

4. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively) . Assumes settled water ozone treatment.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-2d - Public Health Protection Score Card by Agency

Agency: Zone 7

			Agency Baseline			**Concept: Mirant Desalination with Water Quality Element[1]**		**Baseline Plus Portfolio[2,3]**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Mirant with Water Quality Element Source Water**	**Mirant with Water Quality Element Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (PPWTP)**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (DVWTP)**	**Notes**
Supply Quantity											
Critical Year		AFY	38,900			0		38,900			Zone 7 is not interested in additional dry year supply. Any new supplies would offset SBA supplies.
Extended Dry Year		AFY	56,400			0		56,400			
Average Year		AFY	71,400			15,000		71,400			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	0.12 - 0.21	0.11 - 0.20	0.12 - 0.21	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	0.16	0.15	0.16	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	3.2 - 4.3	2.7 - 3.9	3.2 - 4.3	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	3.6	3.1	3.6	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	0.05 - 0.44	0.08 - 0.34	0.05 - 0.44	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	0.18	0.17	0.18	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	2.4 - 6.5	2.1 - 6.3	2.4 - 6.5	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	3.6	3.2	3.6	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	NA	0.01 - 0.01	0.11 - 0.11	0.11 - 0.13	0.11 - 0.11	
	Mean	mg/L	0.19	0.15	0.15	NA	0.01	0.11	0.12	0.11	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	NA	0.1 - 0.7	3.2 - 3.2	2.6 - 2.6	3.2 - 3.2	
	Mean	mg/L	4.0	3.7	3.7	NA	0.4	3.2	2.6	3.2	
pH	Qual		somewhat variable	less variable	less variable	NA	constant	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	variable	variable	less variable	less variable	
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	214 - 317	224 - 327	224 - 327	
	Mean	mg/L	507	517	517	NA	NA	260	270	270	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	166 - 601	175 - 610	175 - 610	
	Mean	mg/L	384	394	394	NA	NA	288	298	298	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	NA	51 - 59	196 - 203	206 - 213	206 - 213	
	Mean	mg/L	296	306	306	NA	55	200	210	210	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	55 - 75	57 - 73	
	Mean	ug/L	NA	86	89	NA	NA	NA	62	63	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	37 - 46	37 - 45	
	Mean	ug/L	NA	44	46	NA	NA	NA	41	40	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	43 - 103	47 - 105	
	Mean	ug/L	NA	67	67	NA	NA	NA	61	63	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	27 - 65	28 - 70	
	Mean	ug/L	NA	39	39	NA	NA	NA	39	39	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND - ND	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	ND	NA	ND	ND	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	3 - 7	NA	54 - 55	55 - 56	
	Mean	ug/L	NA	68	69	NA	5	NA	54	55	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	4 - 8	NA	37 - 38	38 - 39	
	Mean	ug/L	NA	43	43	NA	6	NA	37	38	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved overall quality	improved overall quality	improved overall quality	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	minimal likelihood	minimal likelihood	Potential reservoir mixing issues

1. The Mirant Desalination with Water Quality Element concept was selected for inclusion in this analysis. The The Bay Area Use of the Freeport Regional Water Project and Near Bay Bridge with Water Quality Element concepts would also provide average year water quality benefits to Zone 7, however, all three concepts require the same available capacity in the EBMUD system, and only one of the three concepts could be implemented at one time.

2. For the purposes of this analysis, it was assumed that water will be conveyed to the EBMUD distribution system via the Mokelumne Aqueduct. EBMUD water quality presented in the Baseline Plus Concept columns reflect blending of projected Mirant with Water Quality Element concept deliveries with projected Mokelumne deliveries. In actuality, water quality impacts of this concept may be isolated to the San Ramon Valley system.

3. Values in these columns represent the quality of the Mokelumne-Mirant blend after treatment by EBMUD (assumes settled water ozone treatment).

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-2e - Public Health Protection Score Card by Agency

Agency: CCWD

			Agency Baseline		Baseline Plus Portfolio		
Performance Measure/Objective	**Metric or Qual**	**Units**	**CCWD Source Water**	**CCWD Treated Water[1]**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water[1]**	**Notes**
Supply Quantity							
Critical Year		AFY	176,800		176,800		
Extended Dry Year		AFY	170,800		176,800		
Average Year		AFY	139,400		139,400		
Variability for Treatment							
Critical Year							
Bromide	Range	mg/L	0.22 - 0.66	0.16 - 0.58	0.15 - 0.39	0.10 - 0.31	
	Mean	mg/L	0.43	0.35	0.26	0.20	
TOC	Range	mg/L	2.6 - 5.4	1.8 - 4.2	3.1 - 6.1	2.2 - 4.8	
	Mean	mg/L	4.0	3.0	3.9	2.9	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Extended Dry Year							
Bromide	Range	mg/L	0.04 - 0.65	0.03 - 0.57	0.04 - 0.62	0.03 - 0.54	
	Mean	mg/L	0.25	0.20	0.19	0.14	
TOC	Range	mg/L	2.2 - 7.6	1.4 - 6.1	2.2 - 7.6	1.4 - 6.1	
	Mean	mg/L	3.8	2.7	3.7	2.7	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Average Year							
Bromide	Range	mg/L	0.07 - 0.27	0.05 - 0.22	0.06 - 0.22	0.03 - 0.17	
	Mean	mg/L	0.17	0.12	0.14	0.10	
TOC	Range	mg/L	2.7 - 6.3	1.8 - 4.9	2.7 - 6.4	1.8 - 5.0	
	Mean	mg/L	3.7	2.7	3.8	2.8	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Total Dissolved Solids							
Critical Year	Range	mg/L	334 - 856	355 - 877	245 - 532	266 - 554	
	Mean	mg/L	580	601	384	405	
Extended Dry Year	Range	mg/L	159 - 842	181 - 863	158 - 812	179 - 834	
	Mean	mg/L	370	392	299	321	
Average Year	Range	mg/L	176 - 398	198 - 419	168 - 331	189 - 352	
	Mean	mg/L	273	295	243	265	
Disinfection Byproducts							
Critical Year							
Bromate	Range	ug/L	NA	2 - 4	NA	1 - 2	
	Mean	ug/L	NA	2	NA	2	
THM4	Range	ug/L	NA	54 - 82	NA	55 - 84	
	Mean	ug/L	NA	68	NA	63	
HAA5	Range	ug/L	NA	19 - 26	NA	22 - 28	
	Mean	ug/L	NA	23	NA	24	
Extended Dry Year							
Bromate	Range	ug/L	NA	0.3 - 3	NA	ND - 3	
	Mean	ug/L	NA	1	NA	1	
THM4	Range	ug/L	NA	41 - 92	NA	42 - 87	
	Mean	ug/L	NA	60	NA	57	
HAA5	Range	ug/L	NA	18 - 33	NA	19 - 34	
	Mean	ug/L	NA	25	NA	25	
Average Year							
Bromate	Range	ug/L	NA	0.3 - 2	NA	0.3 - 1	
	Mean	ug/L	NA	1	NA	1	
THM4	Range	ug/L	NA	48 - 0	NA	44 - 75	
	Mean	ug/L	NA	57	NA	55	
HAA5	Range	ug/L	NA	21 - 31	NA	21 - 32	
	Mean	ug/L	NA	25	NA	26	
Taste and Odor							
Source of water	Qual		NA	NA	improved overall quality	improved overall quality	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal likelihood	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Assumes 75% Bollman, 25% Randall Bold blend.

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	Portfolio Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Los Vaqueros Reservoir Expansion: CALFED Los Vaqueros Expansion Studies (CALFED, 2004) project capital costs of $1290 M and operating costs of $27.5 M ($2008). Calaveras capital costs are estimated at $426 M, with operating costs estimated as $3.5 M per year ($2003). Mirant Desalination with Water Quality Element: Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider capital, operating and potential buy-in/wheeling fees. Life-cycle costs for the capital element of the Mirant concept only are $2.5M/year. Unit costs for capital cost portion only are $280/AF/yr, assuming deliveries to Z7 in 60% of all years (based on drought-frequency from CalFed Common Assumptions studies). Calaveras Reservoir Expansion: Capital costs for the Calaveras Reservoir Expansion include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing station. Pumping costs estimated as $3.5 M/year. All costs in $2003. Operating costs and annualized costs to be determined as part of future SFPUC studies.
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	Allocation of Costs will not be determined as part of this study.
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): High Impact.** The overall impact of the two reservoir expansions in combination with the Mirant Desal with WQ would be high. Reservoir expansion would be associated with inundation of biological resources. Depending on the location of other facilities (e.g., conveyance facilities, interties, pump stations), potential effects to biological resources could occur; however, these facilities would be located in disturbed areas to the extent feasible, thus reducing their potential for adverse impacts. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities would be developed to reduce high impacts to the environment. For both reservoir expansions, the mitigation strategy includes protection, restoration, and enhancement of existing watershed lands and other lands. In general, mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources for all portfolio facilities include, but are not limited to, alternative siting of facilities to avoid sensitive resources, preconstruction surveys, implementation of standard BMPs, restriction on construction schedule, monitoring, and if necessary, acquisition of regulatory permits and implementation of regulatory permit conditions.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): High Benefits.** ELV would be considered a benefit to Delta resources because it would reduce direct fish losses from water diversions through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). In additional, benefits would be associated with both the Calaveras Reservoir (maximize quality) and Mirant Desal with Water Quality Element as these concepts would reduce spring pumping from the Delta (thus reducing potential effects to Delta resources). **Overall Benefits to the Environment (After Mitigation): High Benefits.** Mitigation acreage requirements for ELV would range from 1,953 to 8,576 acres, thus increasing the amount of overall protected, enhanced, or restored habitat. In addition, mitigation acreage resulting from the Calaveras Reservoir expansion would also increase overall protected land.	
Implementation Potential		
External Support	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
Consistency with Local and Regional Plans	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	7	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	6,300,000 people	

1. To be determined as part of future studies.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Table G12-4 - Environmental Score Card (Page 1 of 2)

Performance Measure/Objective	Portfolio Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** ELV would reduce direct fish losses from water diversions through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). However, expansion of Calaveras Reservoir could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which in turn could affect aquatic habitat. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. Other minor potential effects on the aquatic environment are associated with general construction activities that could increase stormwater runoff to nearby creeks and drainages, and thus affect aquatic resources. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies. In addition, continue trout planting. General mitigation opportunities to reduce short-term construction effects (for all concepts) include, but are not limited to, implementation of standard BMPs (e.g., sediment and erosion control), and restriction on construction schedule (e.g,. avoid construction activities in creeks during the wet season).
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Construction and Operation of ELV would affect approximately 2,500 acres of terrestrial habitats, including: grassland, oak woodland, upland scrub, riparian, urban-ruderal, and agriculture. Depending on the location of other facilities (e.g., conveyance facilities, interties), potential effects to terrestrial resources could occur; however, these facilities would be located in disturbed areas to the extent feasible, thus reducing their potential for adverse terrestrial impacts. **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities for long-term effects to the terrestrial environment would be avoidance of sensitive terrestrial habitat to the extent possible through alternative siting. For ELV, the mitigation strategy includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres. For Calaveras Reservoir expansion, a mitigation strategy that provides for resource restoration or enhancement in and around the watershed would be implemented (replacement ratios of loss habitat may be 3:1 or as deemed appropriate by the regulatory agency). General mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources include, but are not limited to, implementation of standard BMPs (e.g., fence sensitive terrestrial habitats to ensure avoidance), and acquisition of regulatory permits and compliance with permit conditions.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

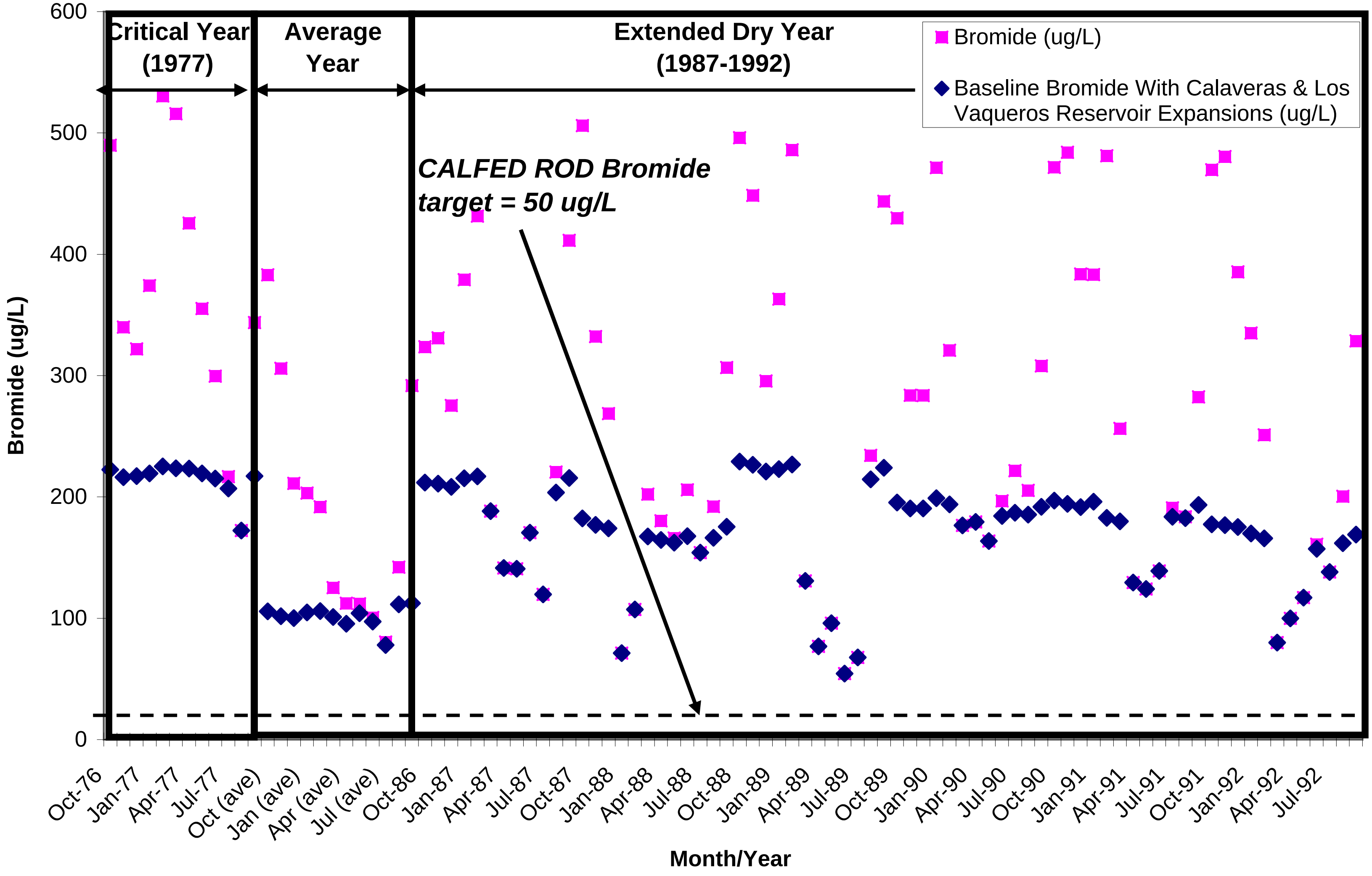
Table G12-4 - Environmental Score Card (Page 2 of 2)

Performance Measure/Objective	Portfolio Rating
Wetlands	
Potential Impacts to Wetland Resources (acreage affected)	**Effects on Wetlands (Before Mitigation): Impacts.** Expansion of Los Vaqueros Reservoir would result in inundation of 1.3 acres of wetlands habitat. Expansion of Calaveras Reservoir would result in inundation of wetlands habitat. Impacts to wetland resources from other facilities development would depend on the location of the individual concept facilities. Construction of conveyance facilities and interties for all concepts may temporarily affect wetland resources (e.g., creek crossing). **Effects on Wetlands (After Mitigation): No Effect.** For ELV, the mitigation strategy identified for Terrestrial Resources, above, would also apply to impacts on wetlands. In general, mitigation opportunities to reduce adverse effects to wetland resources would be avoidance to the extent possible through alternative siting. For Calaveras Reservoir expansion, a mitigation strategy would be developed to enhance and restore wetlands in and around the watershed, at a ratio of 3:1 or as deemed appropriate by regulatory agencies. Consultation with regulatory agencies, permit acquisition, and compliance with permit conditions would be required. General mitigation opportunities to reduce short-term construction and potentially long-term effects to wetland resources include, but are not limited to, delineation of wetlands, implementation of standard BMPs (e.g., installation of silt fence to prevent runoff into wetlands), restriction on construction schedule (limit construction through creeks during dry seasons only), and monitoring.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** Impacts to special-status plant and wildlife species from development of all concepts would depend on the habitat affected, which is determined by the location of the concept facilities. Expansion of Los Vaqueros Reservoir could affect the following species: San Joaquin kit fox, California red-legged frog, California tiger salamander, Western pond turtle, Bald eagle, Curved-foot hygrotis diving beetle, Mason's lilaeopsis, Alkali milk-vetch, Heartscale, Brittlescale, San Joaquin spearscale, Recurved Larkspur, Contra Costa goldfields, Vernal pool fairly shrimp, etc. Expansion of Calaveras Reservoir could affect the following species: Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. Depending on the location of other facilities (e.g., conveyance facilities, interties), potential effects to special-status species could occur; however, as these facilities would be located in disturbed areas to the extent feasible, potential for adverse impacts to special-status species would be reduced. **Effects on Special-Status Species (After Mitigation): No Effect.** For ELV and Calaveras Reservoir expansion, the mitigation strategy identified for Terrestrial Resources, above, would also apply to impacts on special-status species. Mitigation opportunities for effects to special-status species would be avoidance of sensitive habitats to the extent possible, or acquisition of regulatory permits and implementation of regulatory permit conditions if impacts occur. In addition, general mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., construction during non-nesting or -breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for facility operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** All facilities would consume energy. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** For ELV, further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants. Further evaluation would also be required to determine the mitigation opportunities for the Calaveras Reservoir expansion concept.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Source Water Bromide with Concept Bromide

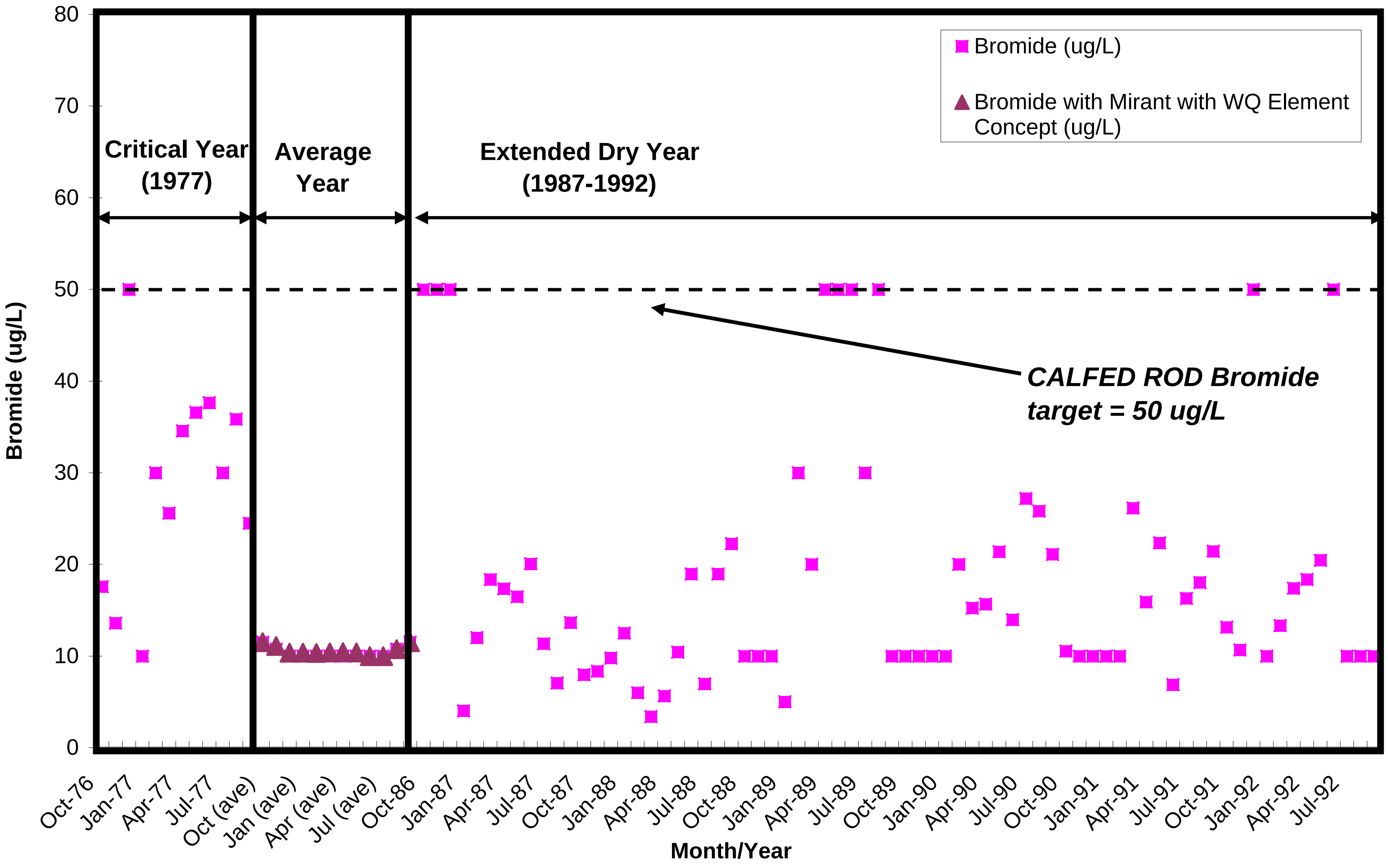


Note: The baseline bromide with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of EBMUD Baseline Source Water Bromide with Concept Bromide

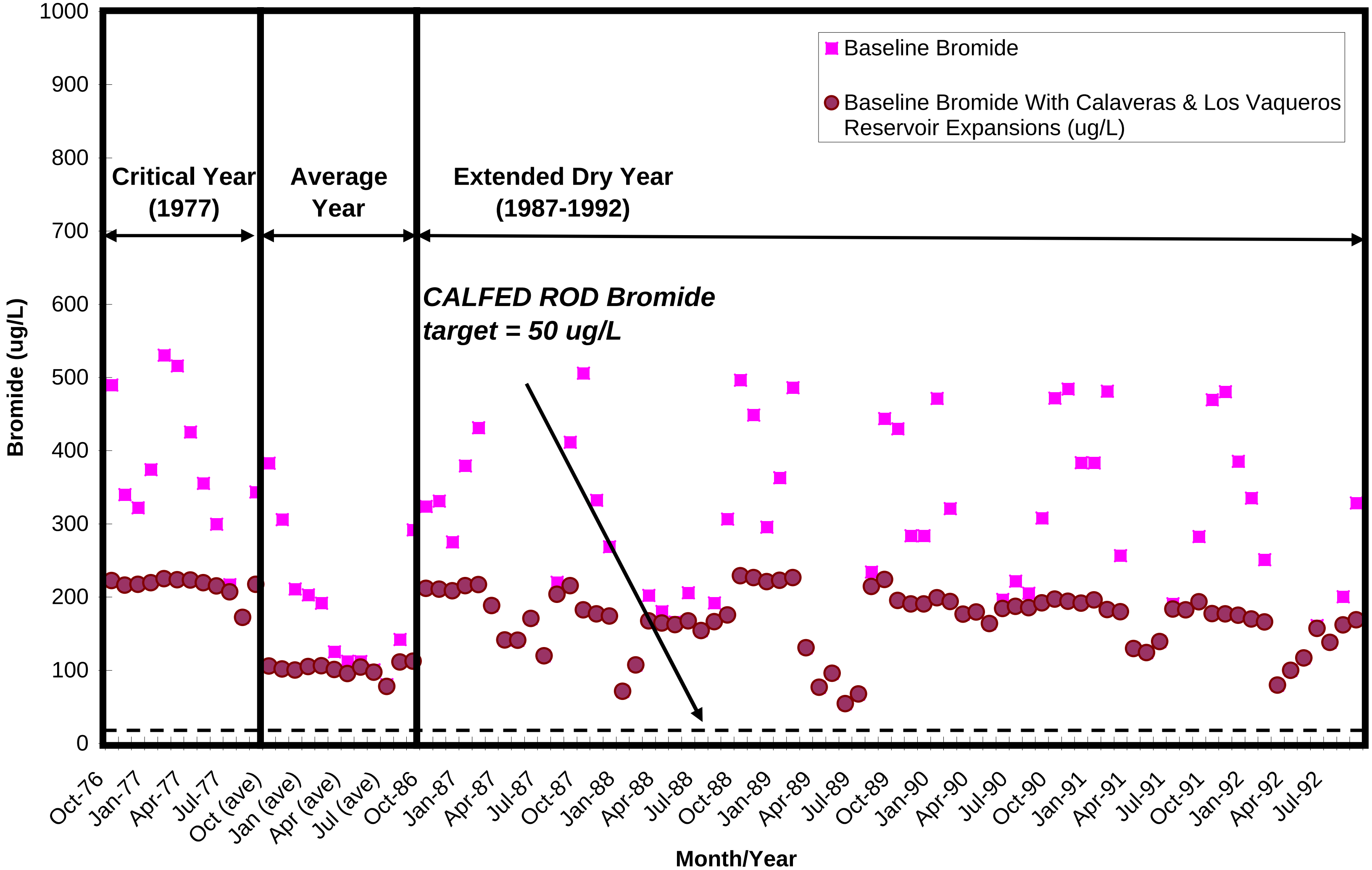


Note: Bromide with Mirant Concept is the blend of Mirant and Mokelumne supplies. Supplies could potentially be conveyed via a dedicated aqueduct, not considered in this evaluation

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of SCVWD Source Water Bromide with Concept Bromide

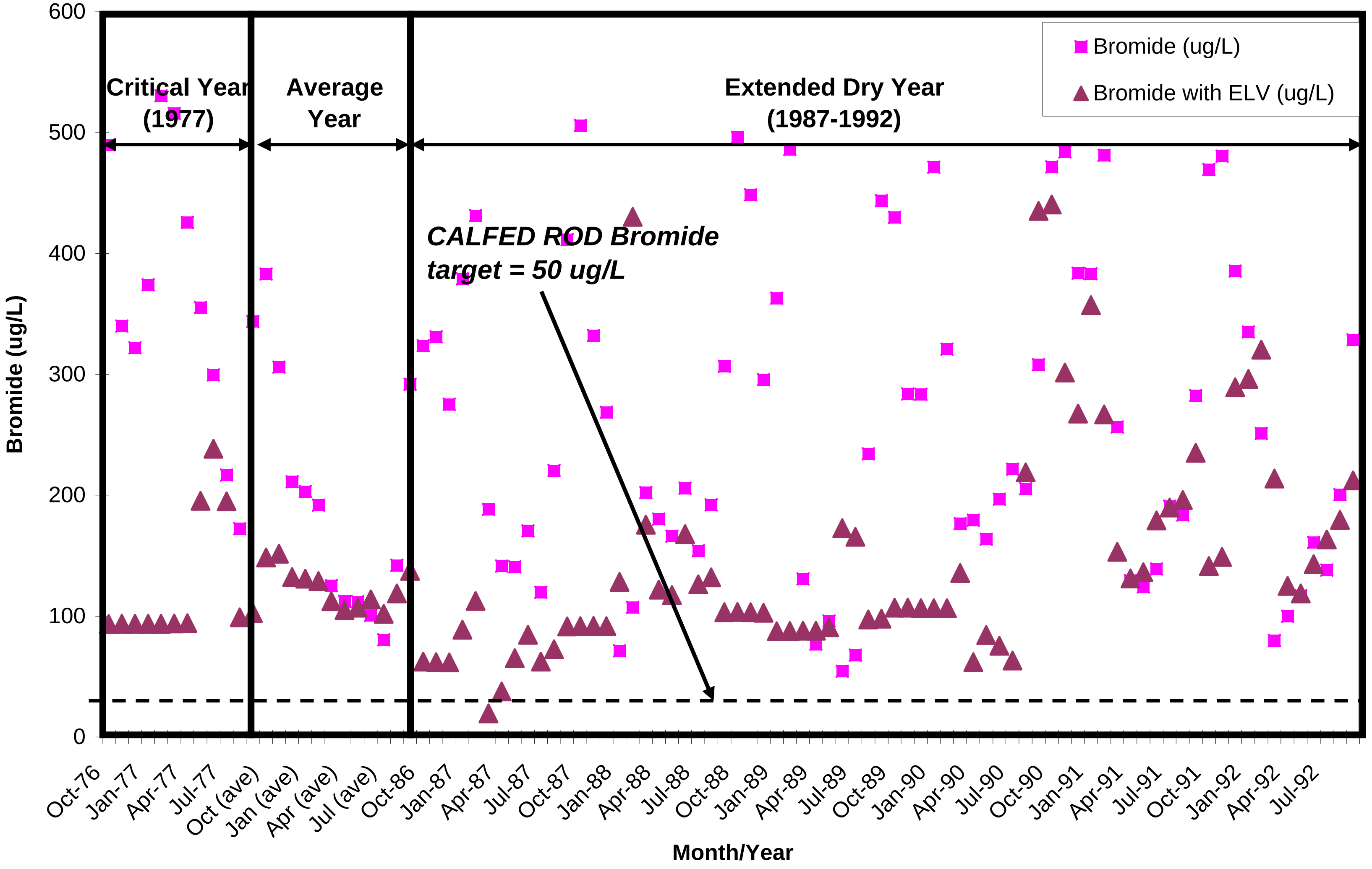


Note: The baseline bromide with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of Zone 7 Baseline Bromide with Concept Bromide

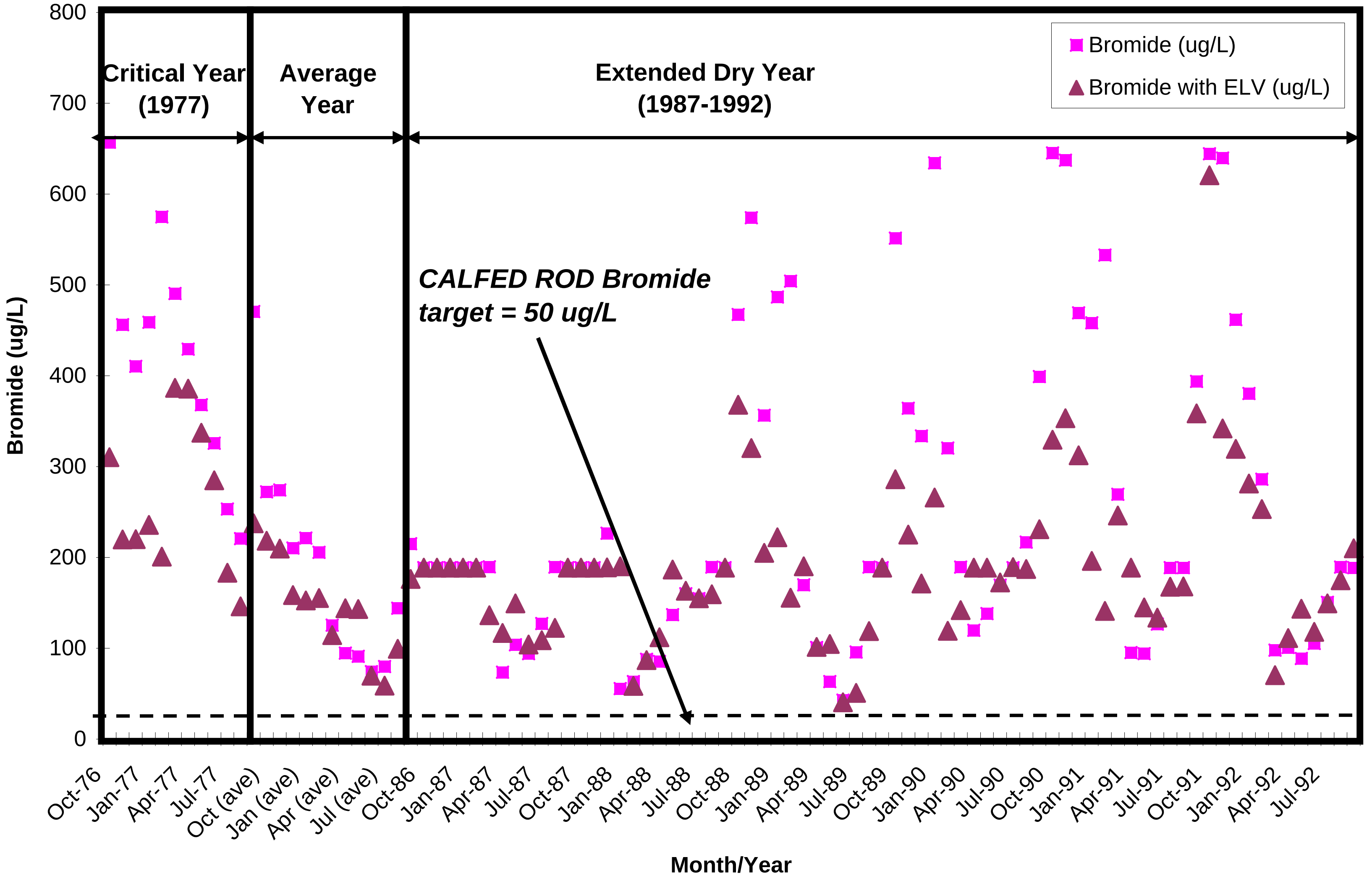


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of CCWD Baseline Bromide with Concept Bromide

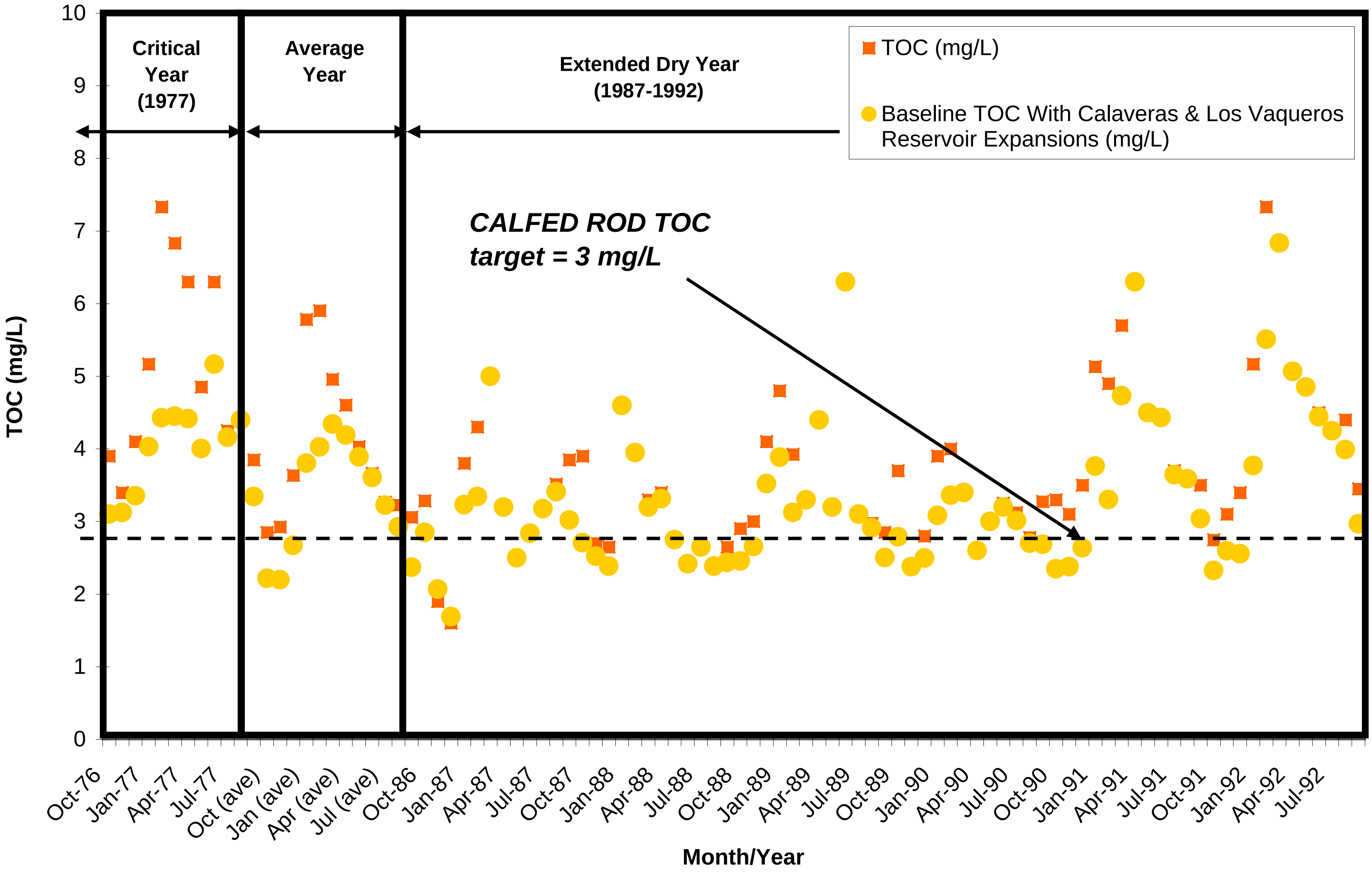


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Source Water TOC with Concept TOC

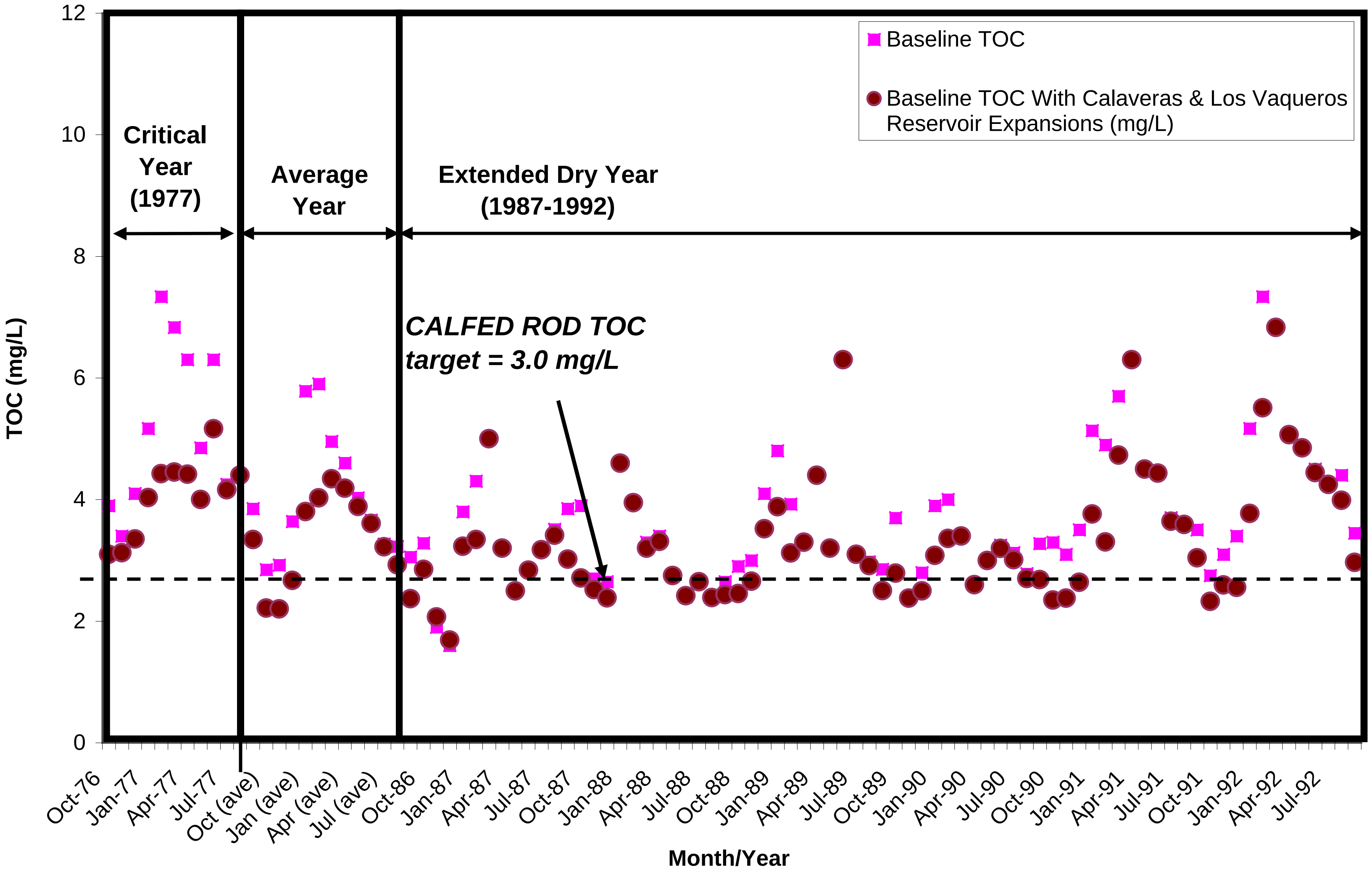


Note: The baseline TOC with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of SCVWD Source Water TOC with Concept TOC

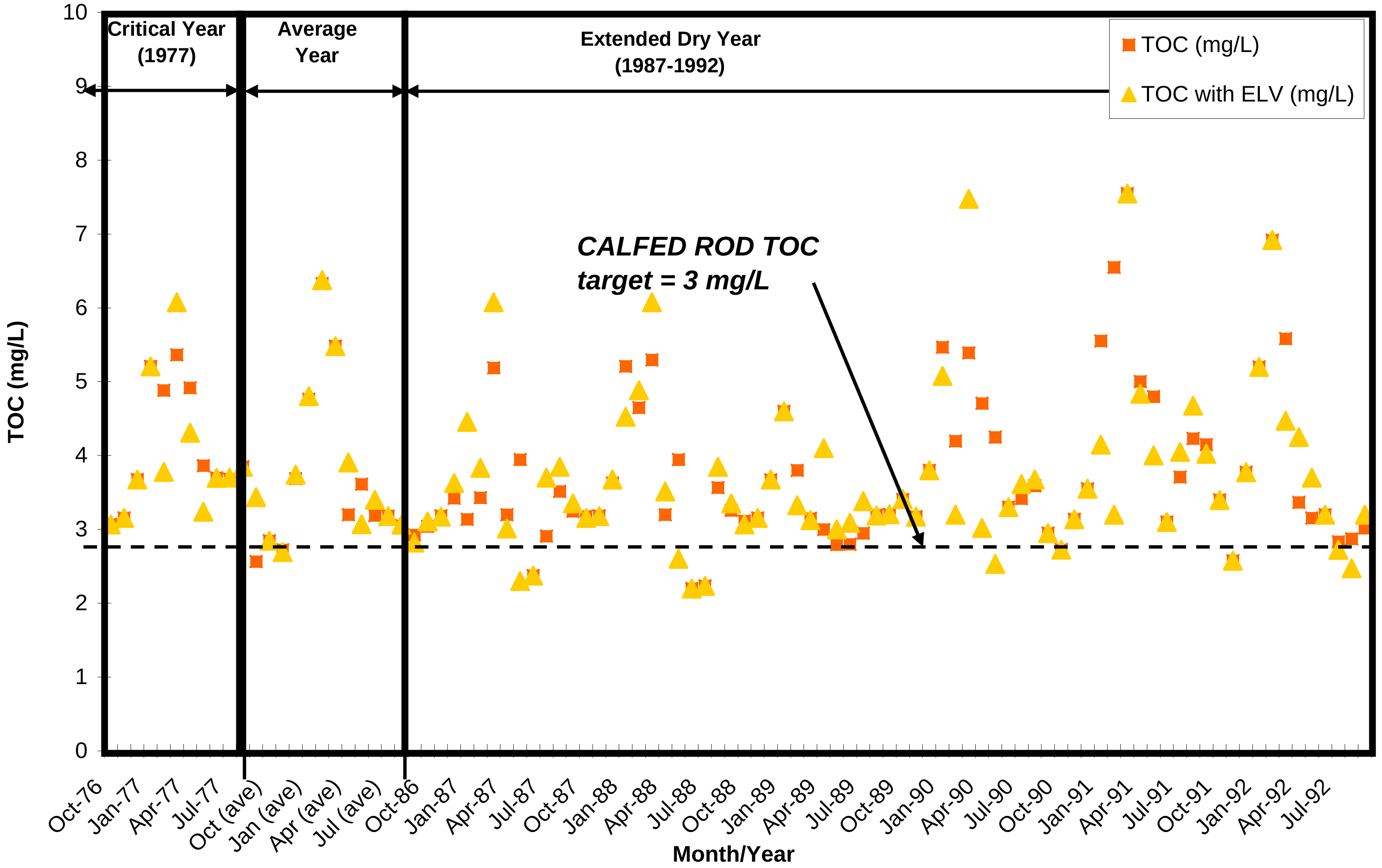


Note: The baseline TOC with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of CCWD Baseline TOC with Concept TOC

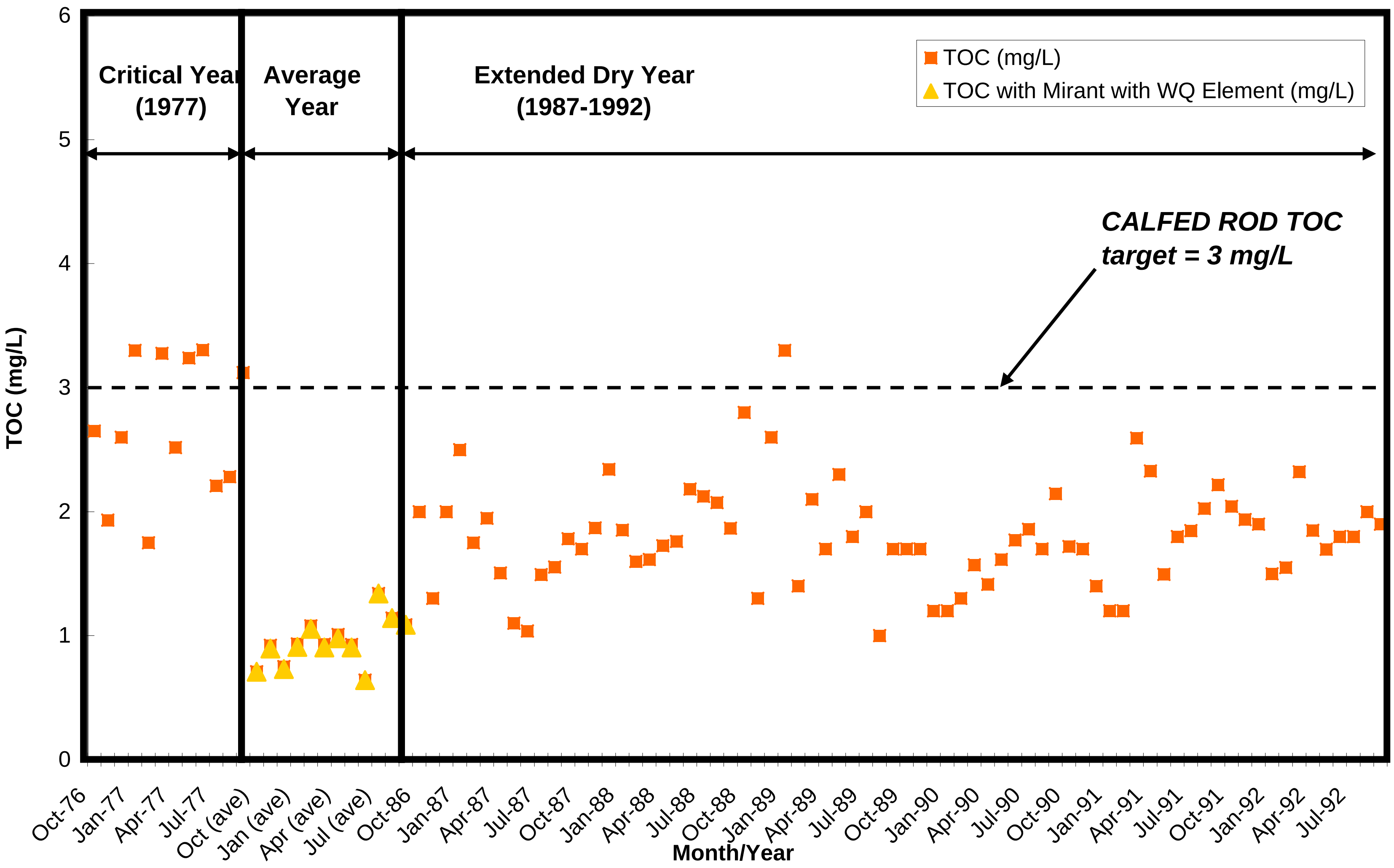


Note: ELV water quality is the flow-weighted mixture of Rock Slough, Old River and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of EBMUD Baseline Source Water TOC with Concept TOC

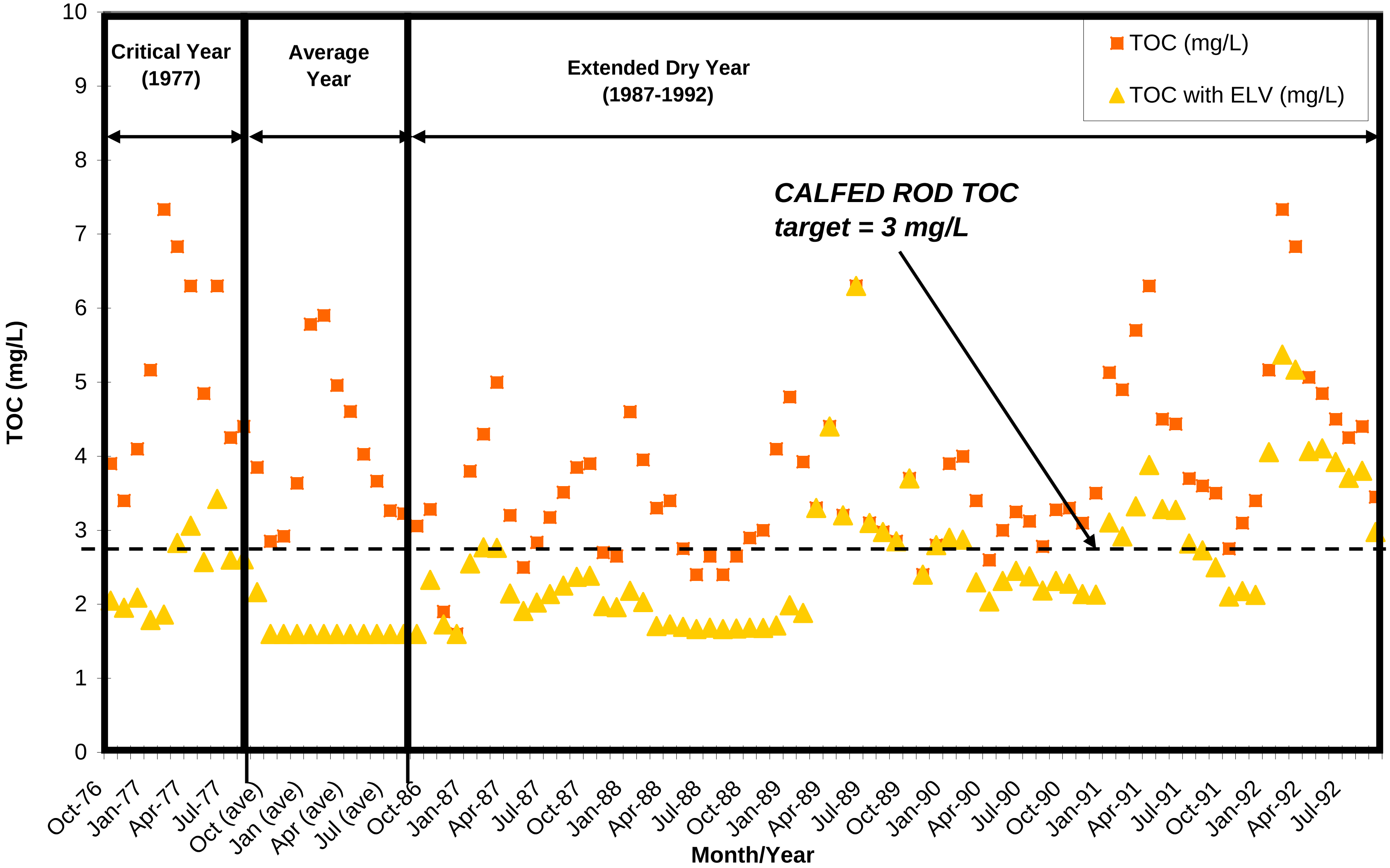


Note: TOC with Mirant Concept is the blend of Mirant and Mokelumne supplies. Supplies could potentially be conveyed via a dedicated aqueduct, not considered in this evaluation.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of Zone 7 Baseline TOC with Concept TOC

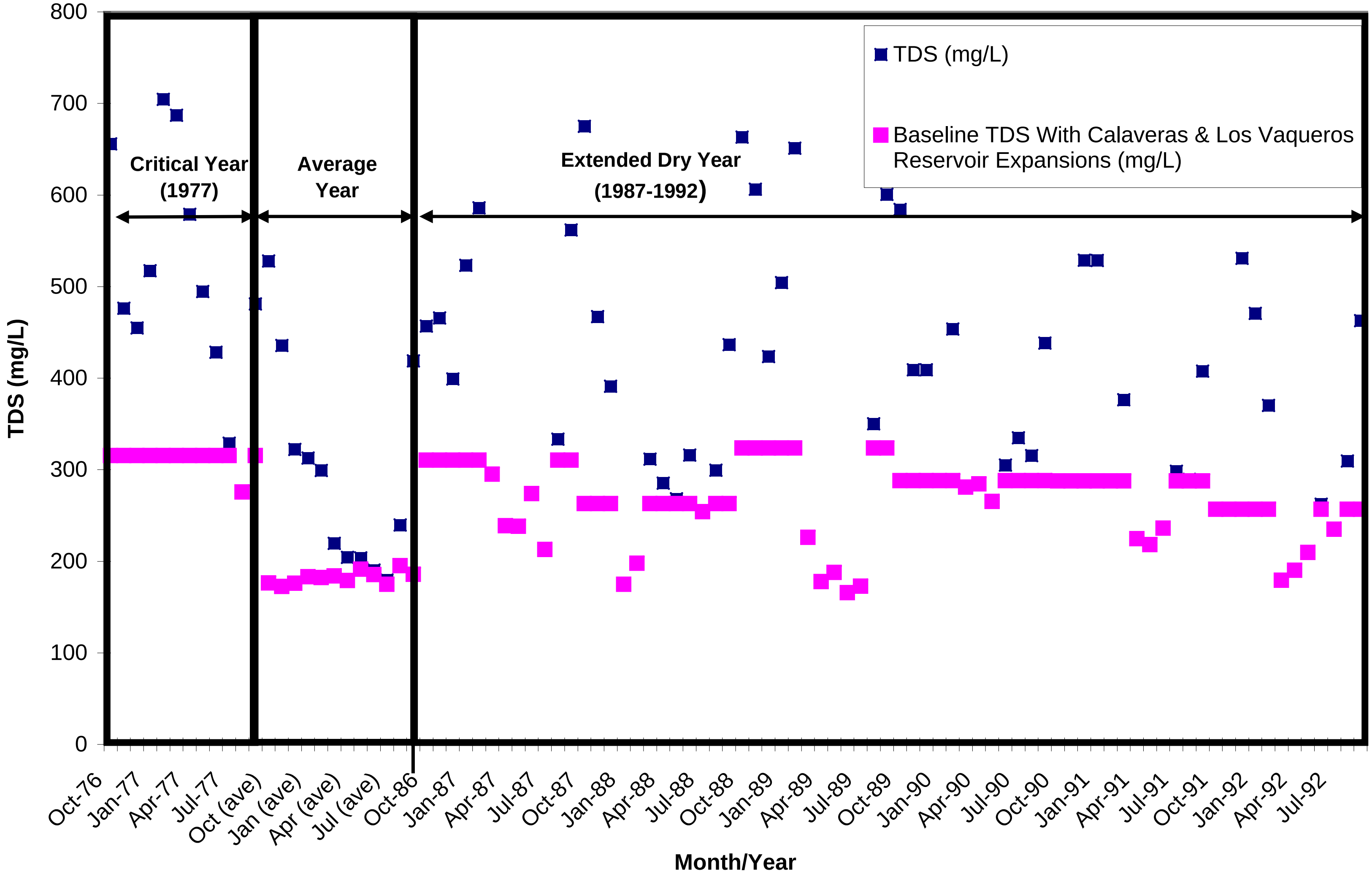


Note: ELV water quality is the flow-weighted mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Source Water TDS with Concept TDS

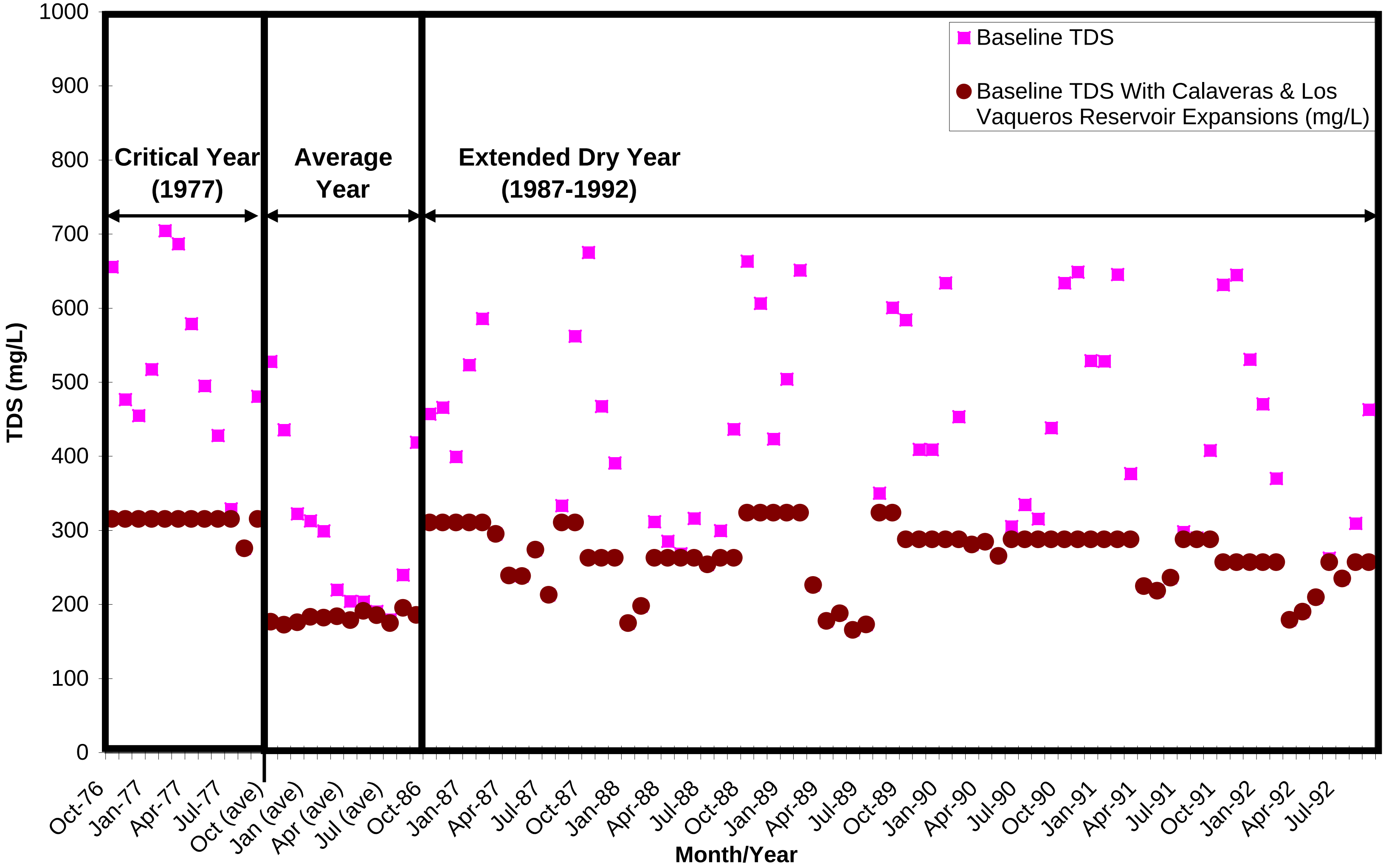


Note: The baseline TDS with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of SCVWD Source Water TDS with Concept TDS

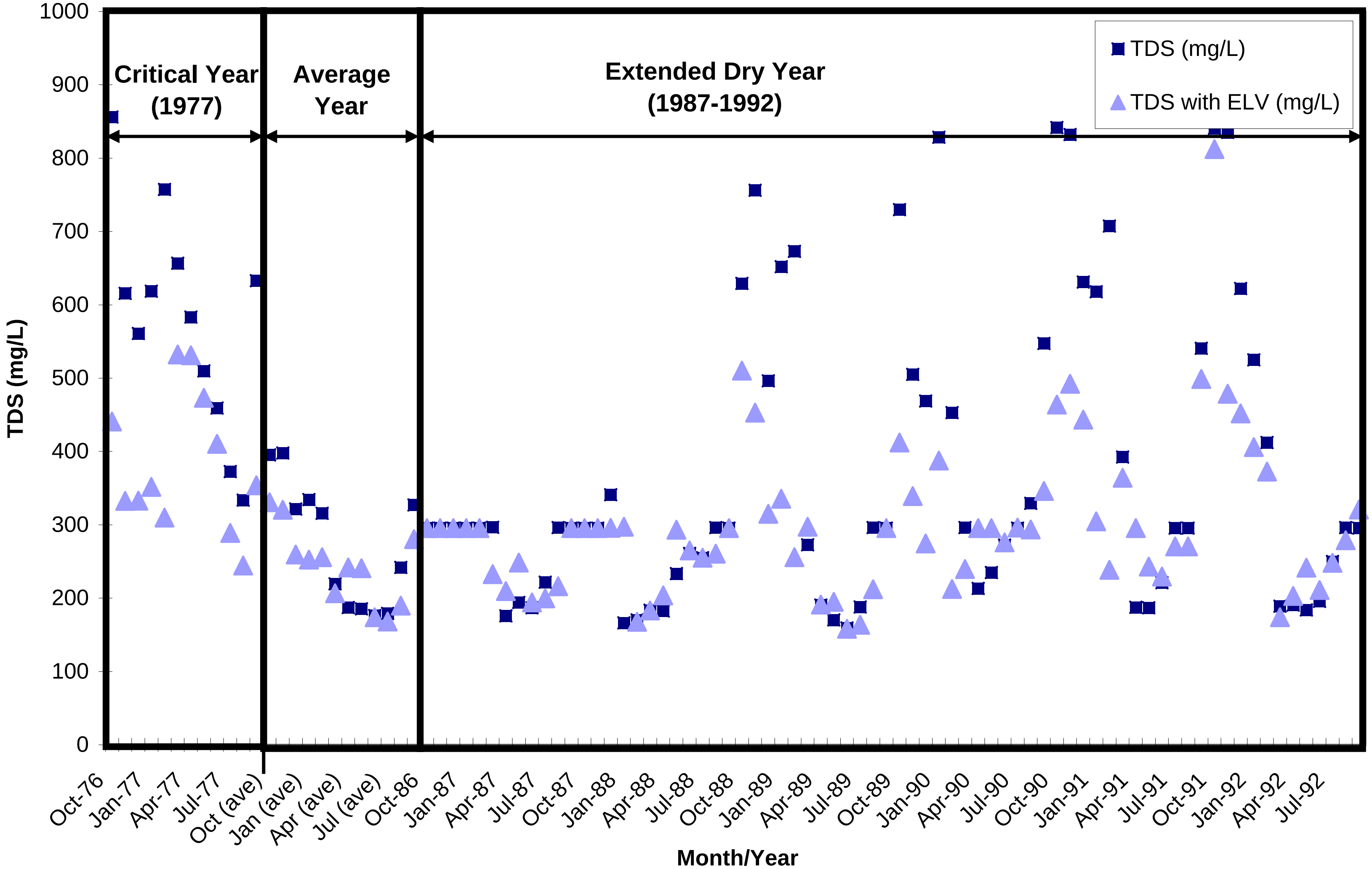


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TDS with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of CCWD Baseline TDS with Concept TDS

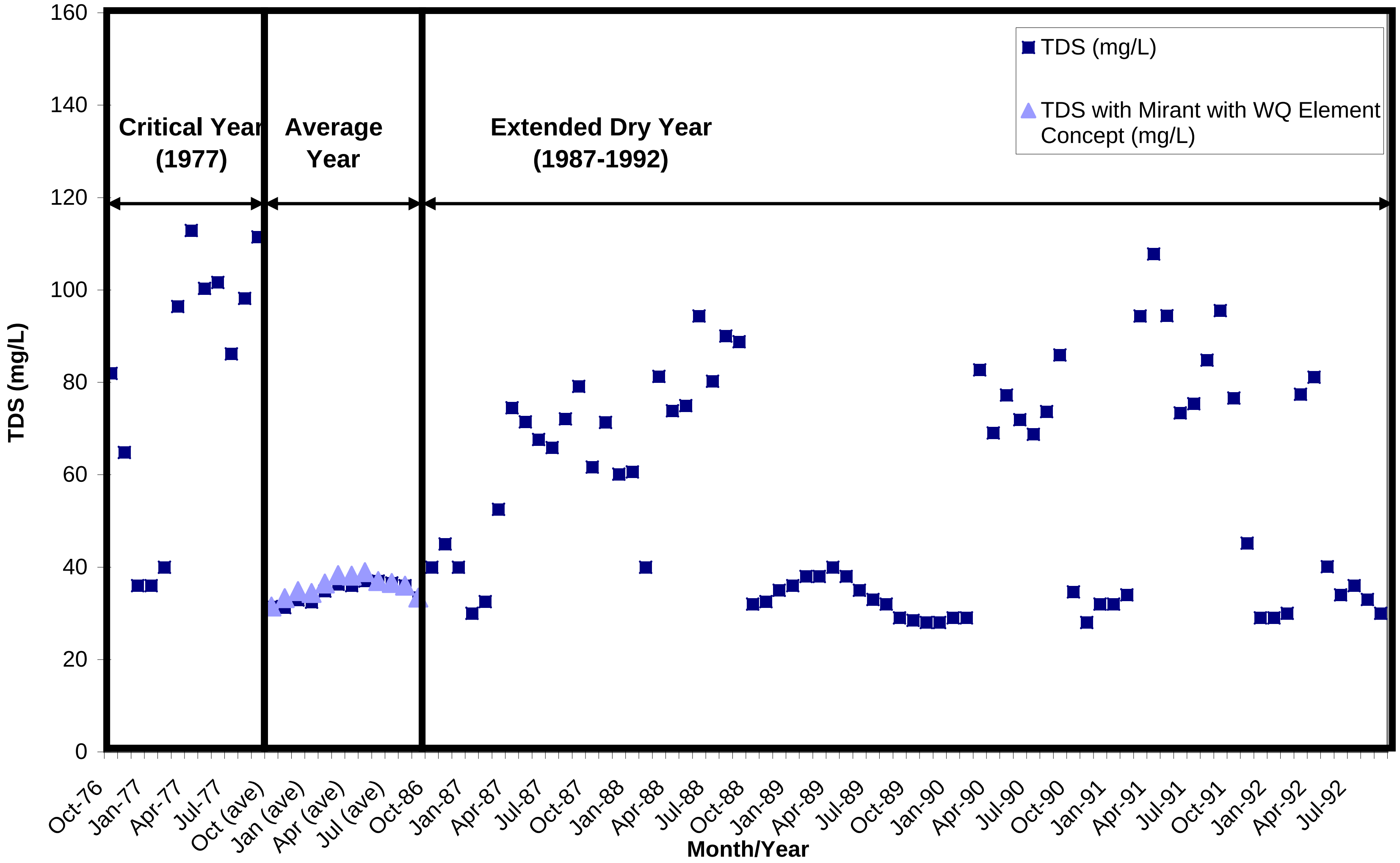


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of EBMUD Baseline Source Water TDS with Concept TDS

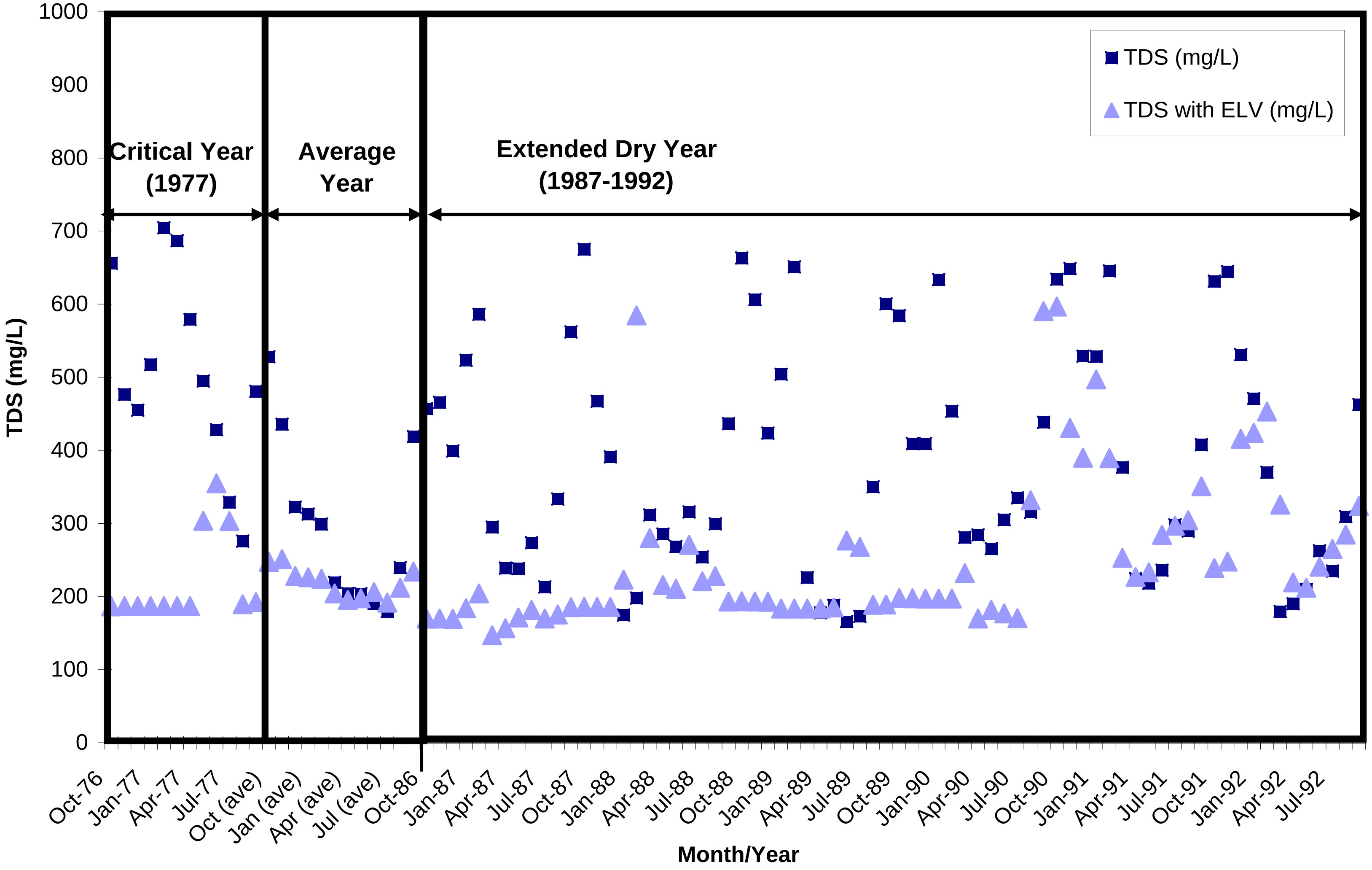


Note: TDS with Mirant Concept is the blend of Mirant and Mokelumne supplies. Supplies could potentially be conveyed via a dedicated aqueduct, not considered in this evaluation.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of Zone 7 Baseline TDS with Concept TDS

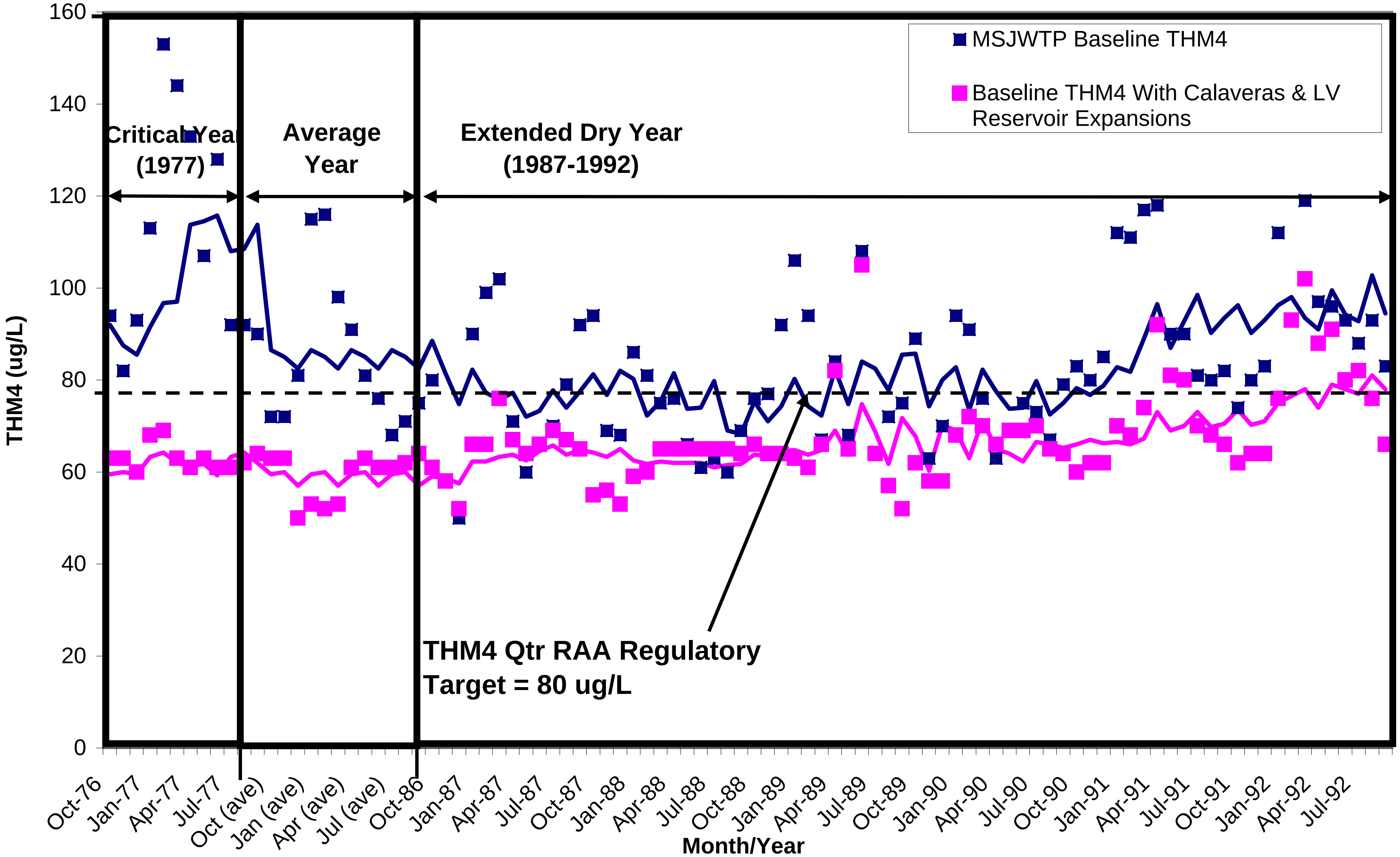


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Baseline THM4 with Concept THM4 (MSJWTP)

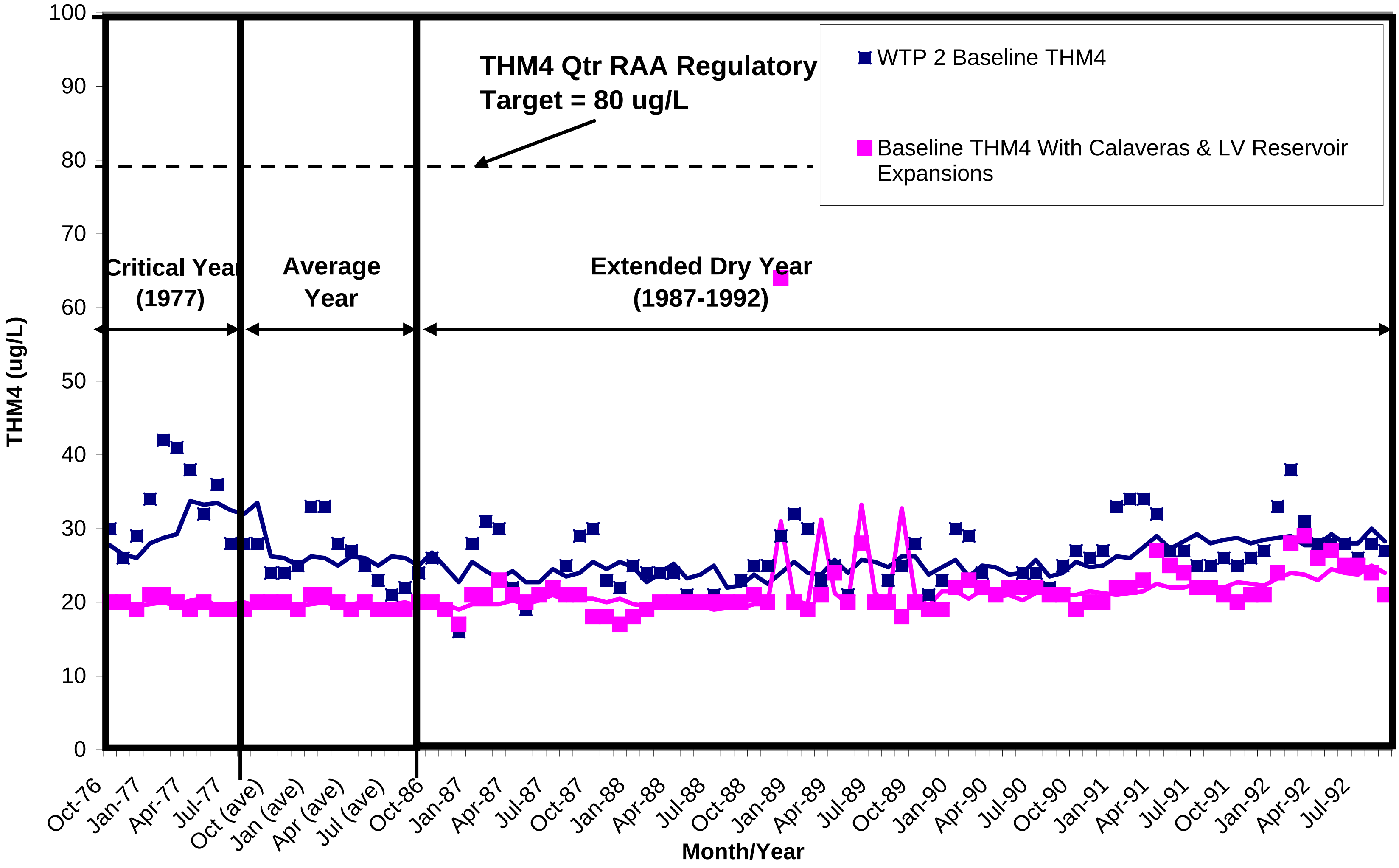


Note: The baseline THM4 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for MSJWTP .

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Baseline THM4 with Concept THM4 (WTP 2)

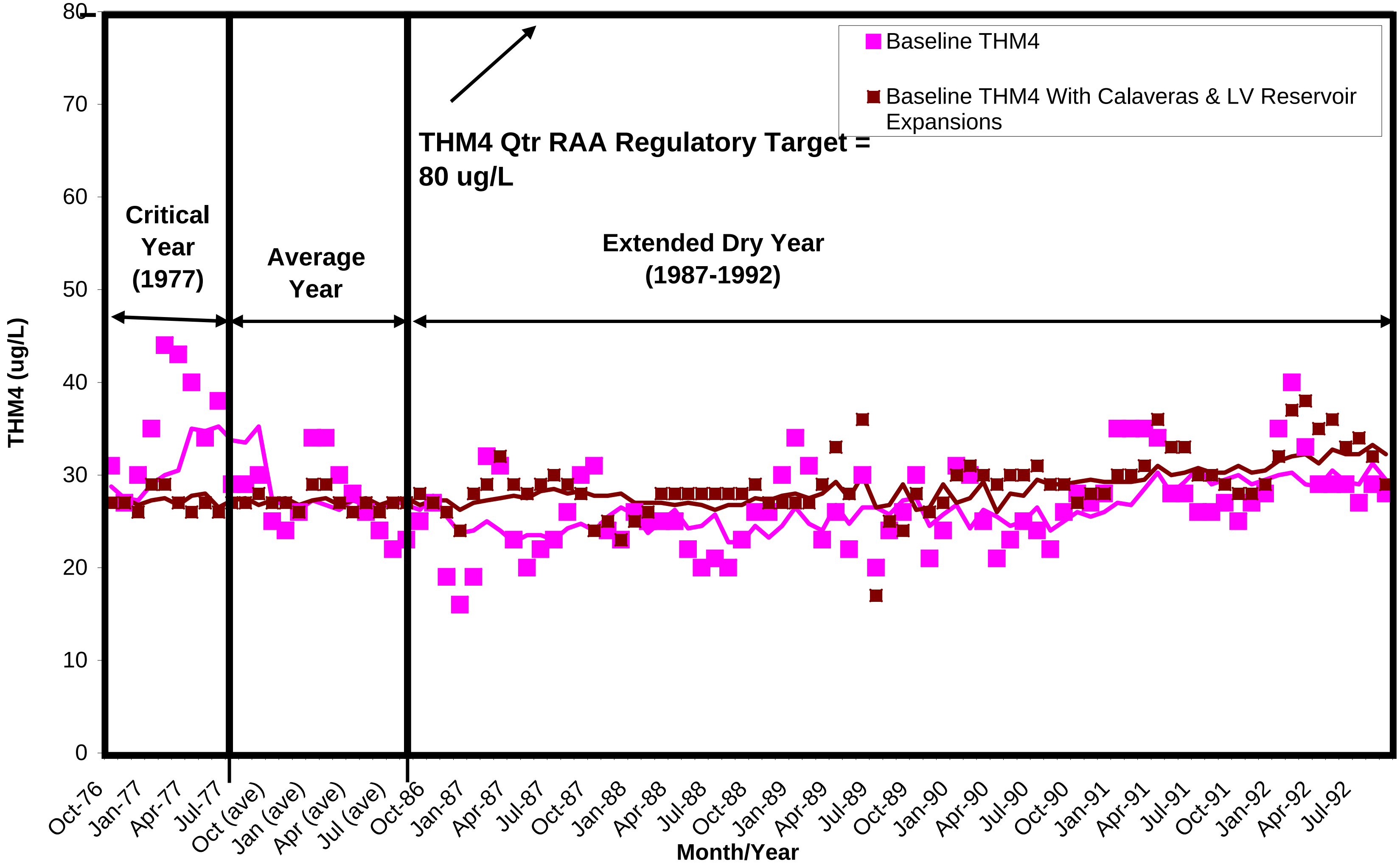


Note: The baseline THM4 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of SCVWD Baseline THM4 with Concept THM4

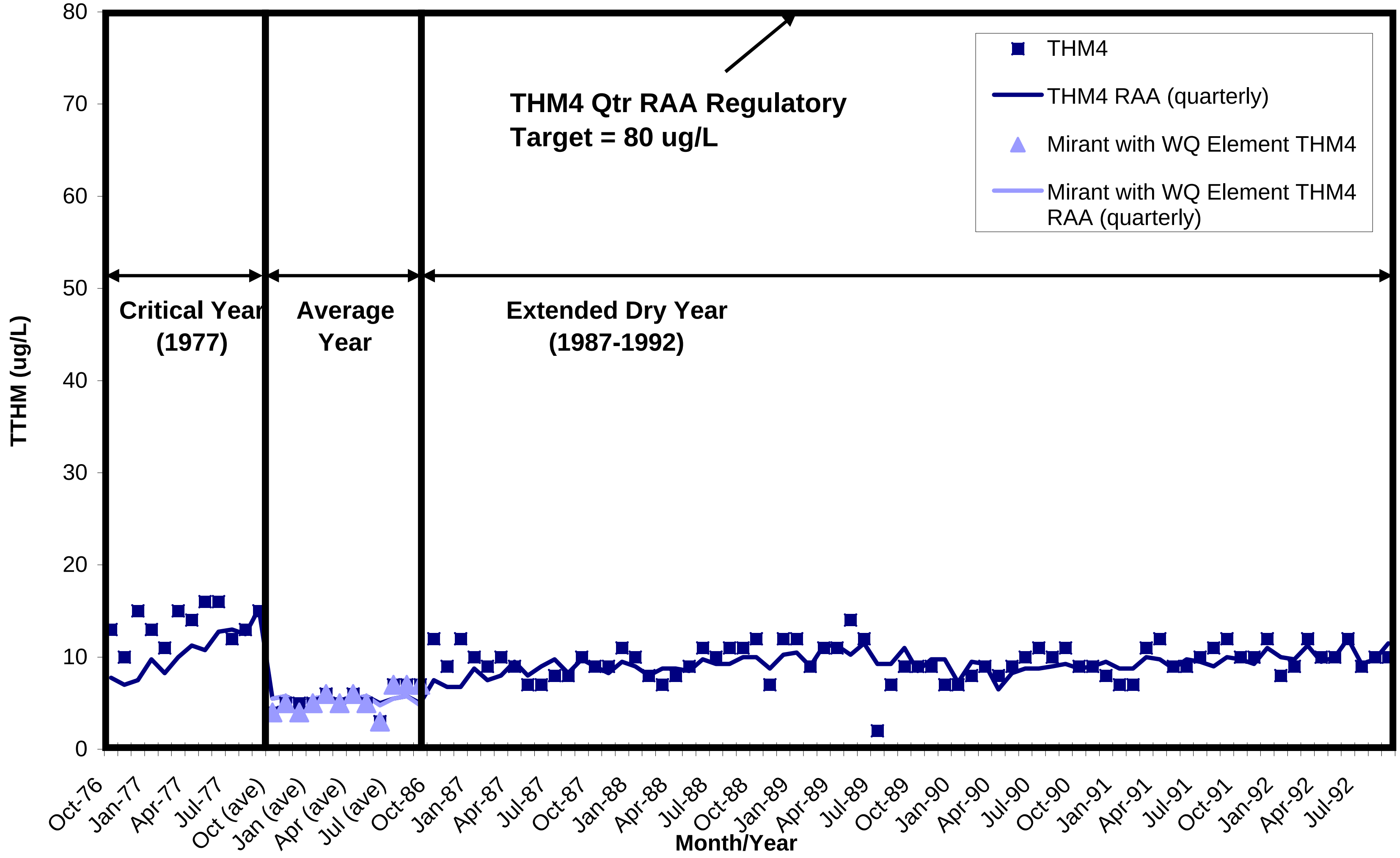


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline THM4 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production assumes settled water

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

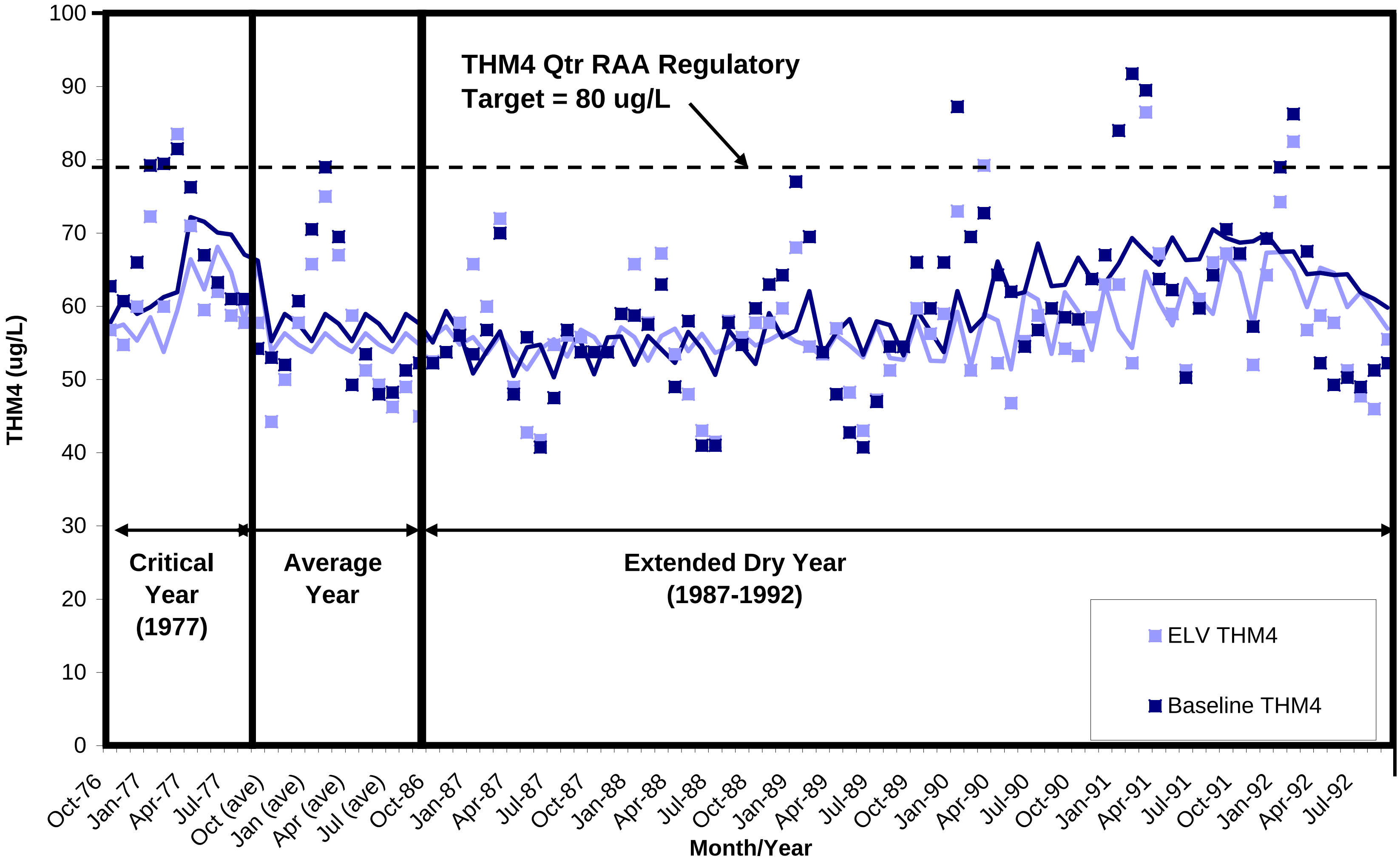
Comparison of EBMUD Baseline THM4 with Concept THM4



Note: Assumes a blend of Mirant and Mokelumne supplies. Supplies could be conveyed via a dedicated aqueduct, not considered in this evaluation. DBP projections assume settled water ozonation.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element



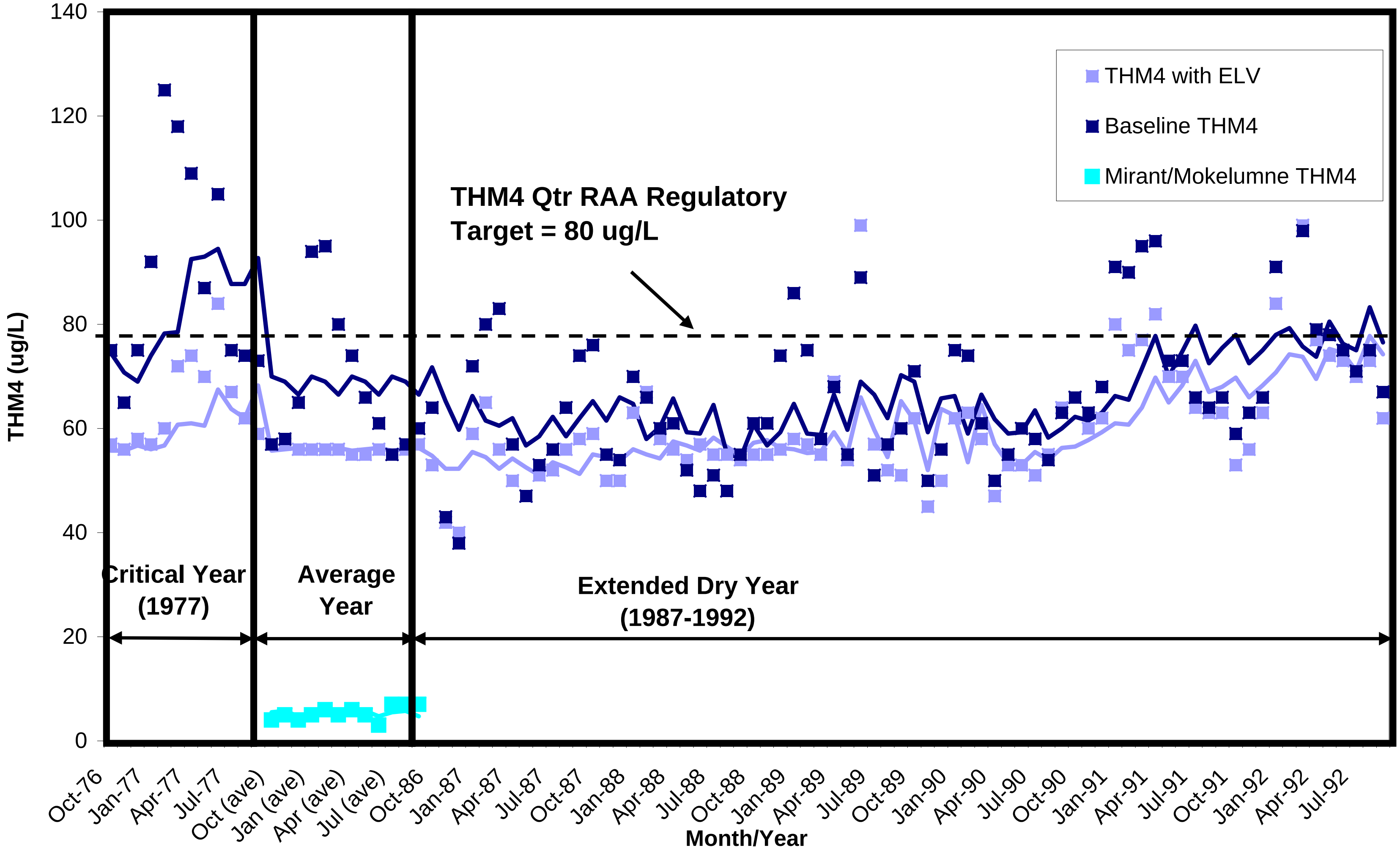
Comparison of CCWD Baseline THM4 with Concept THM4

Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of Zone 7 Baseline THM4 with Concept THM4 (Conventional Treatment)

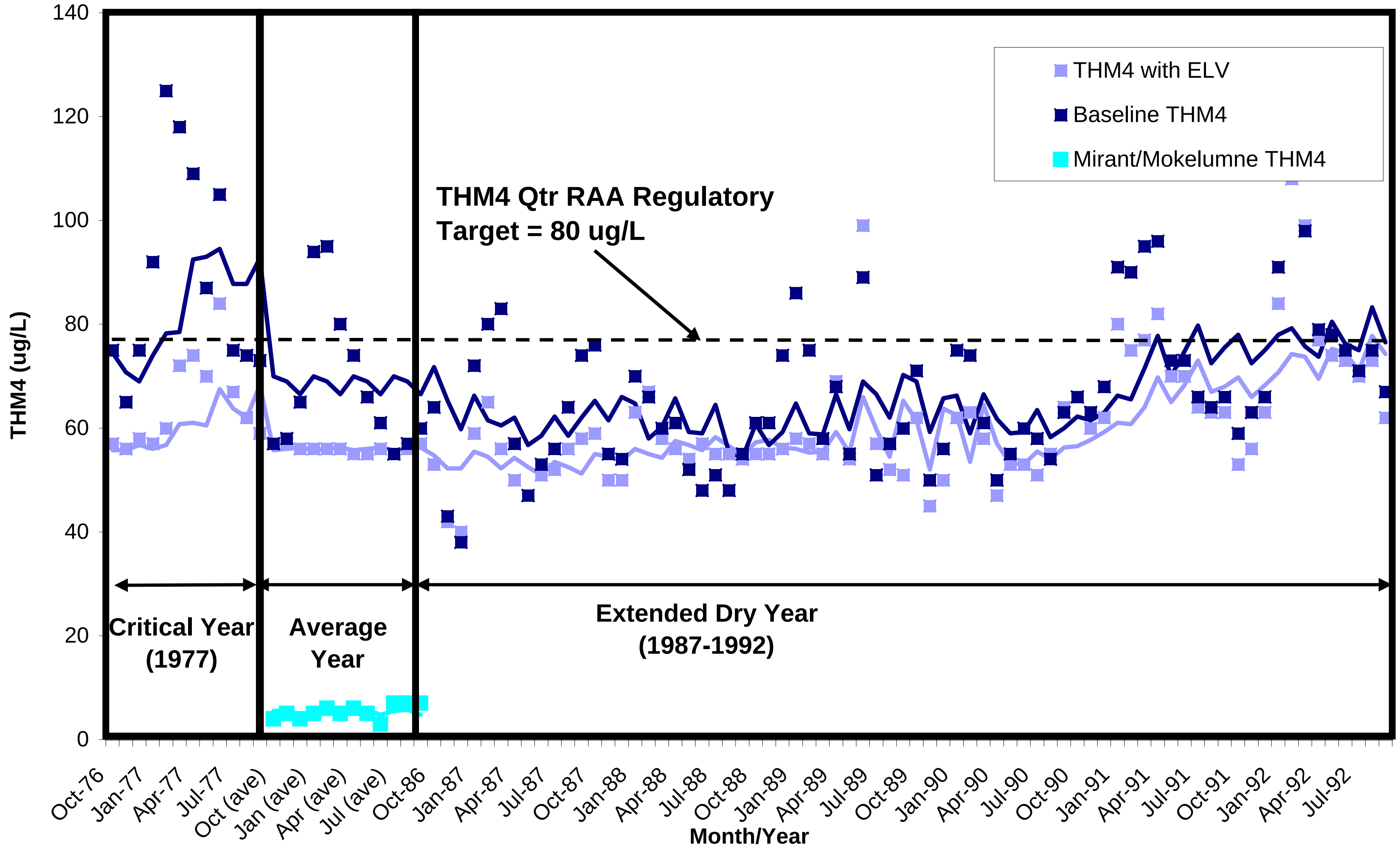


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment. Mirant/Mokelumne blend treated at EBMUD. This supply would be blended with Zone 7 treated water in the distribution system.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of Zone 7 Baseline THM4 with Concept THM4 (UF & Conventional Treatment)

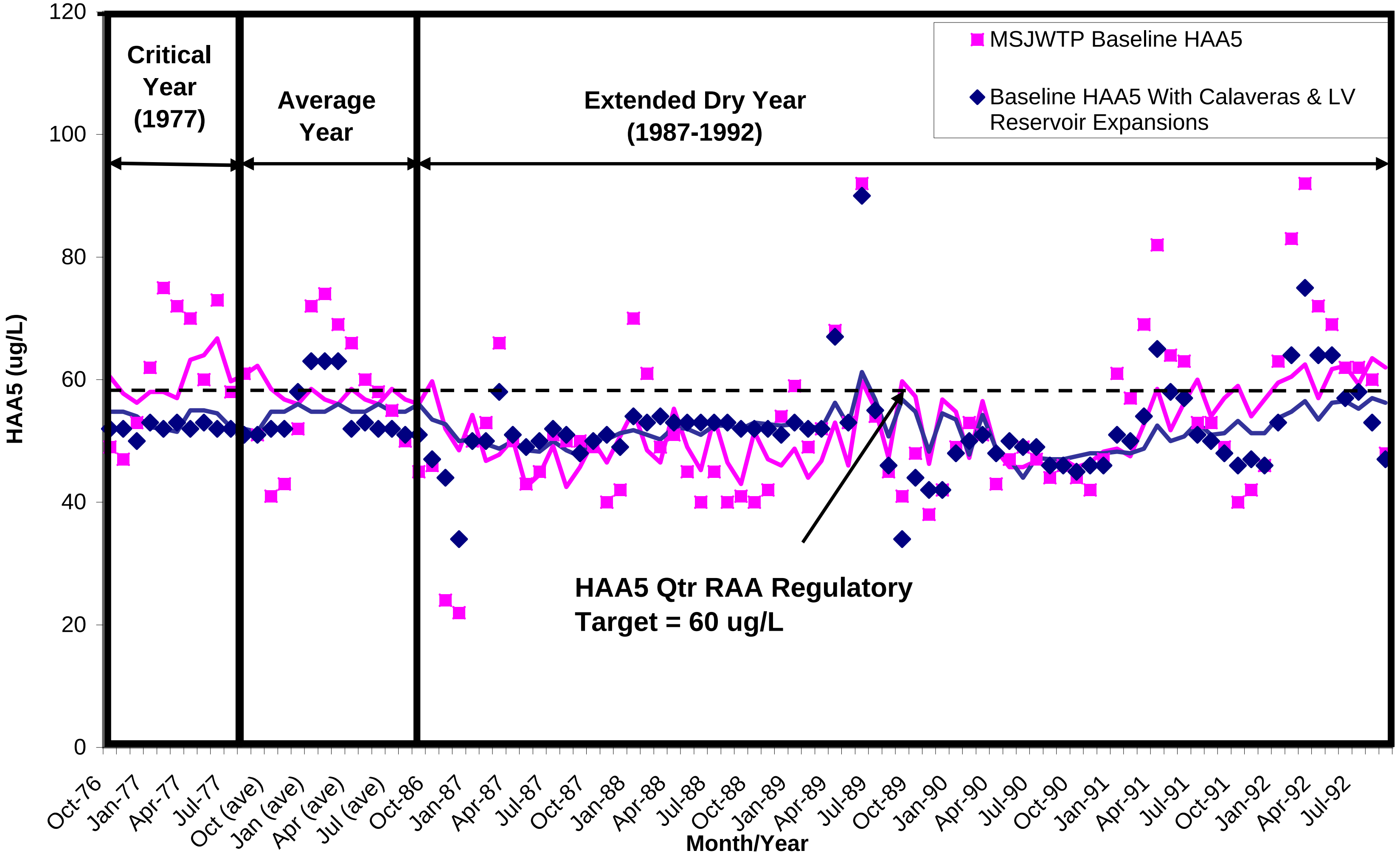


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 8:12 blend of UF:conventionally treated supplies. Mirant/Mokelumne blend treated at EBMUD. This supply would be blended with Zone 7 treated water in the distribution system.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Baseline HAA5 with Concept HAA5 (MSJWTP)

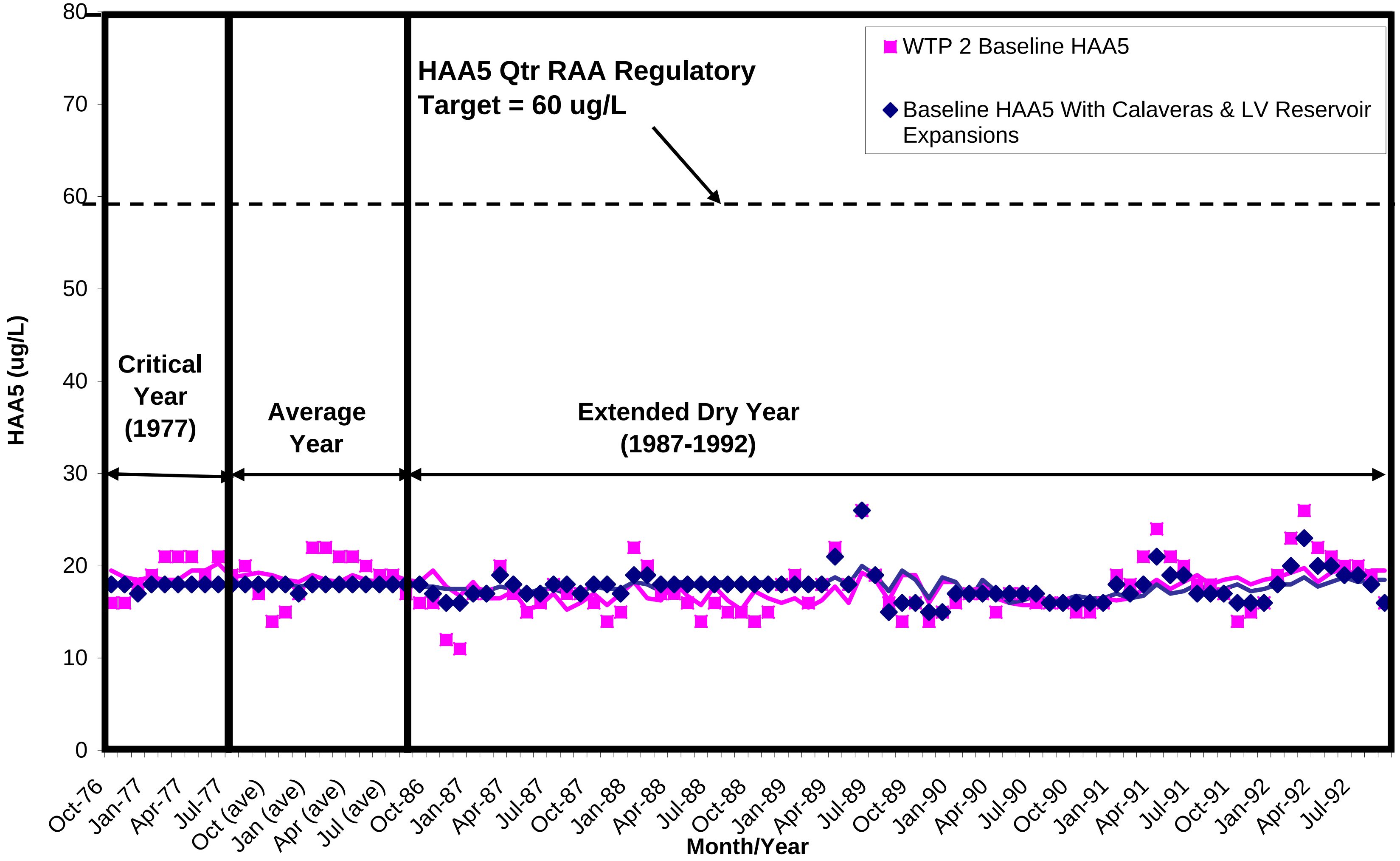


Note: The baseline HAA5 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for MSJWTP .

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Baseline HAA5 with Concept HAA5 (WTP 2)

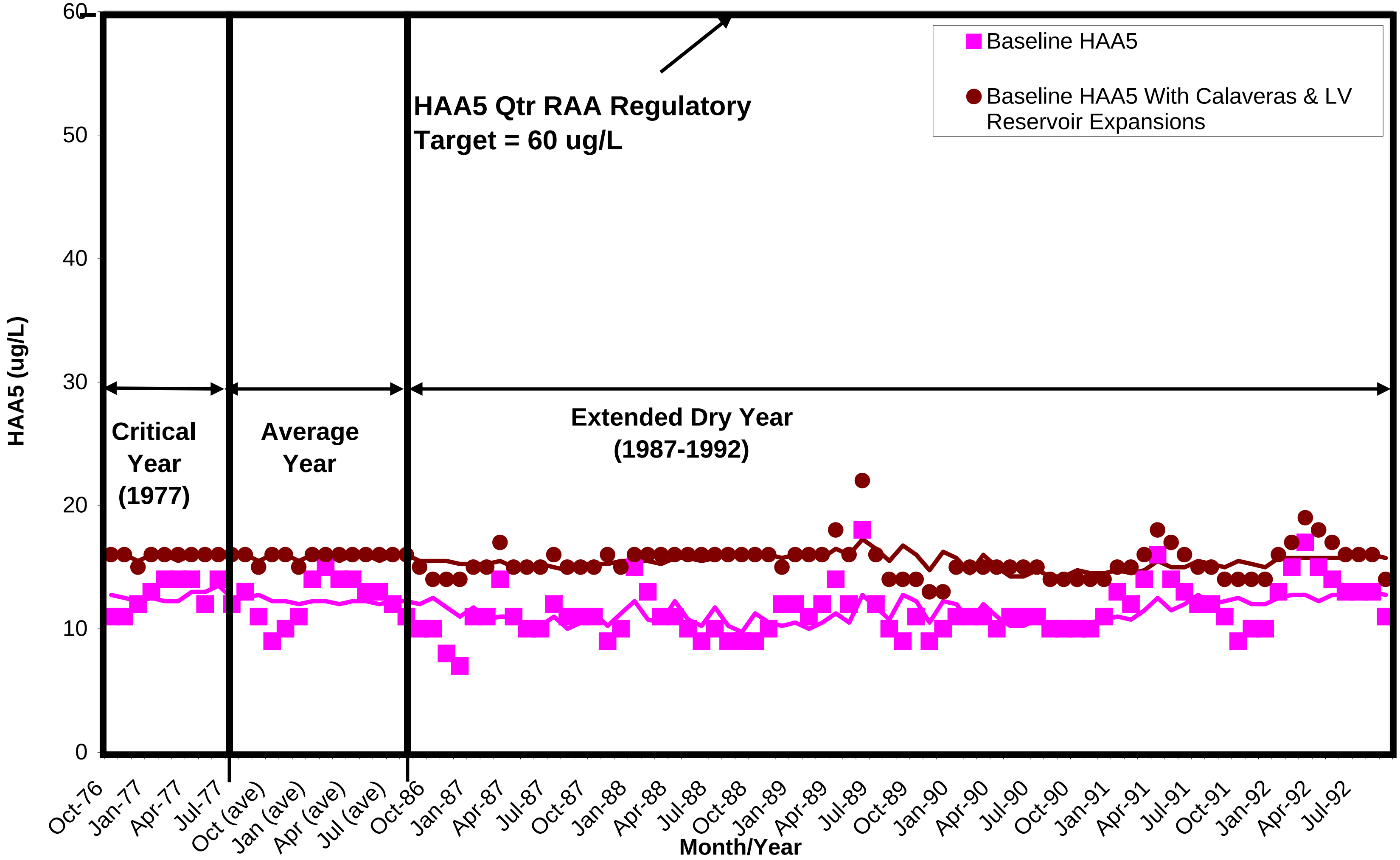


Note: The baseline HAA5 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for WTP 2.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of SCVWD Baseline HAA5 with Concept HAA5

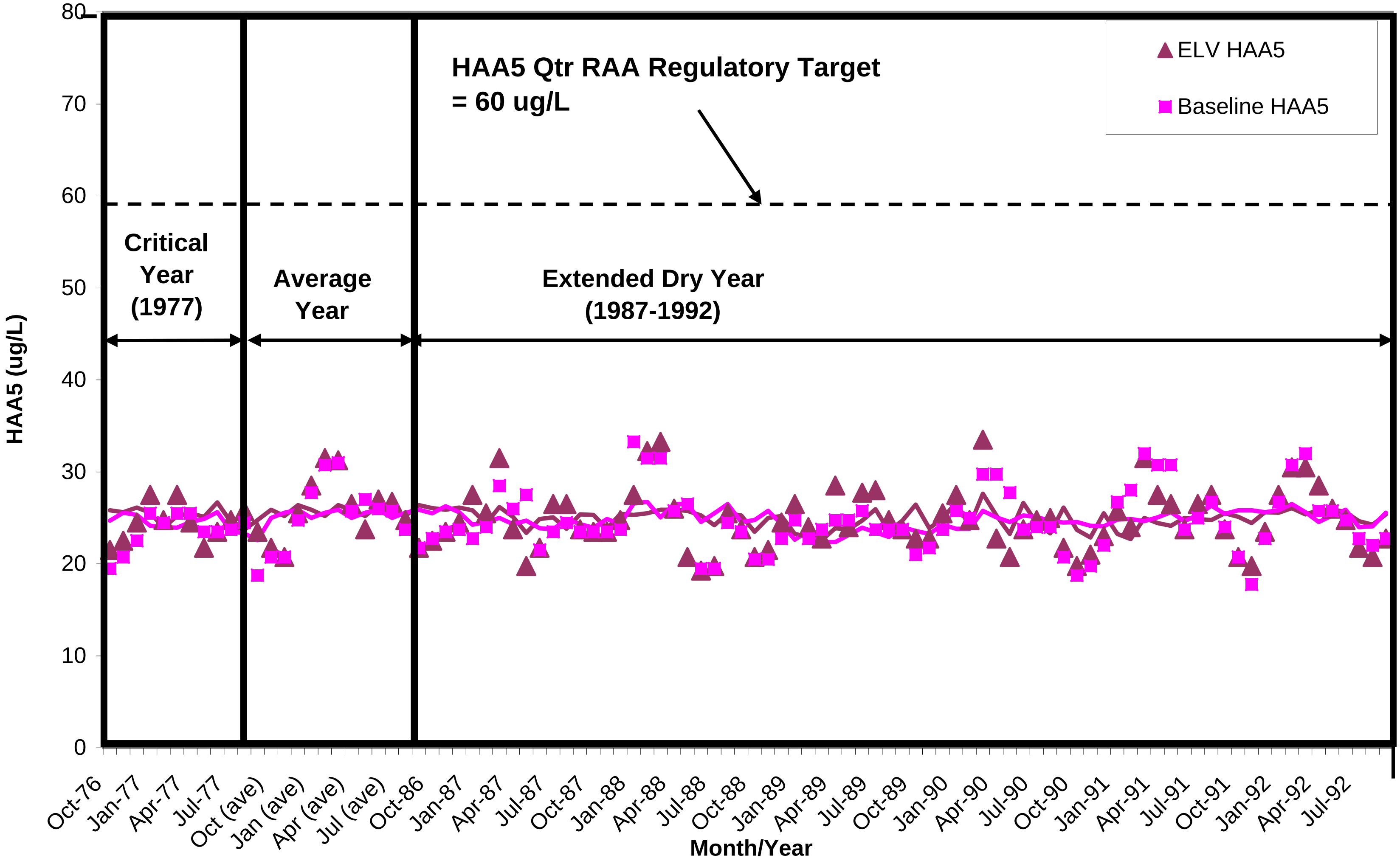


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline HAA5 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production for settled water ozonation.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of CCWD Baseline HAA5 with Concept HAA5

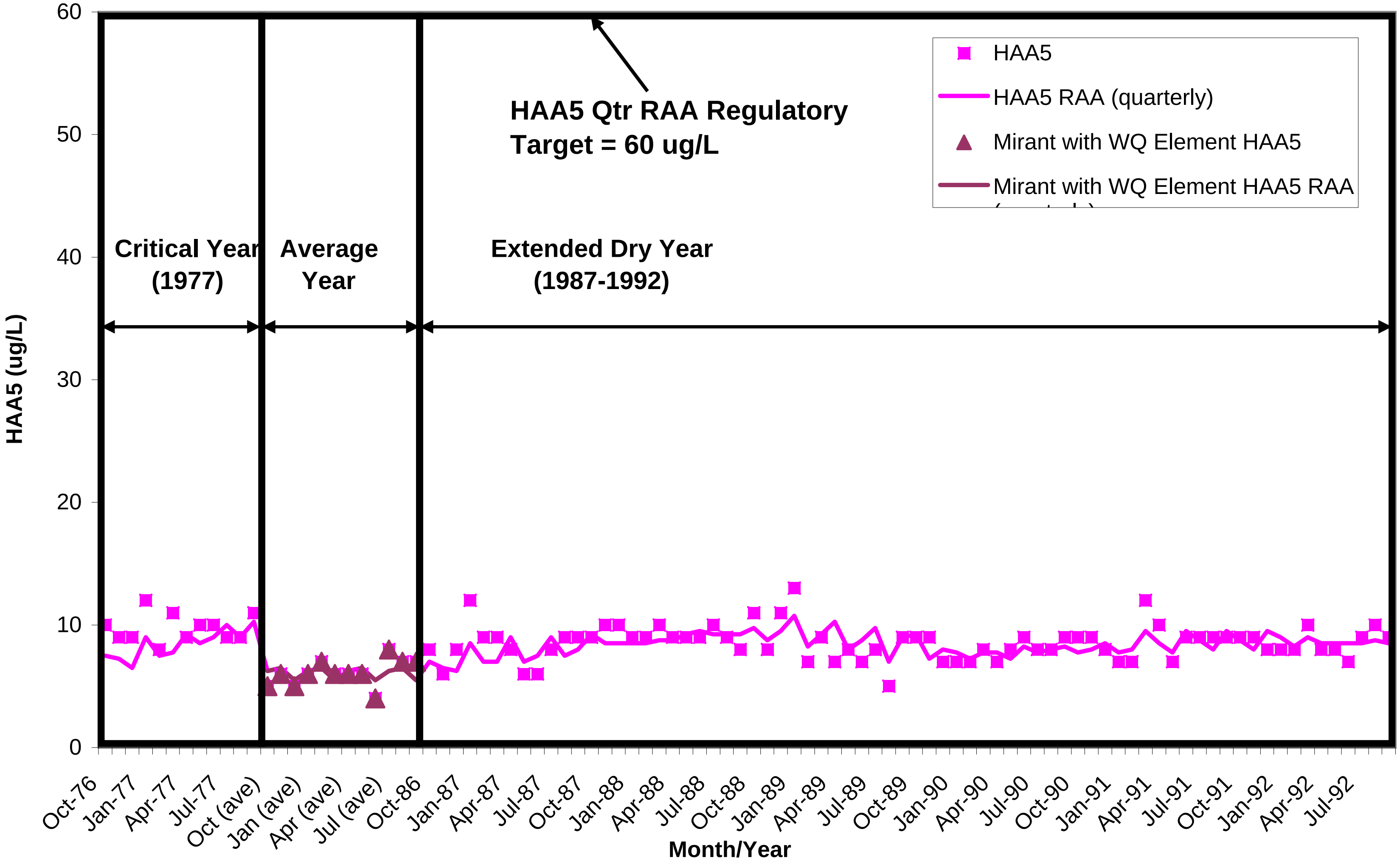


Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of EBMUD Baseline HAA5 with Concept HAA5

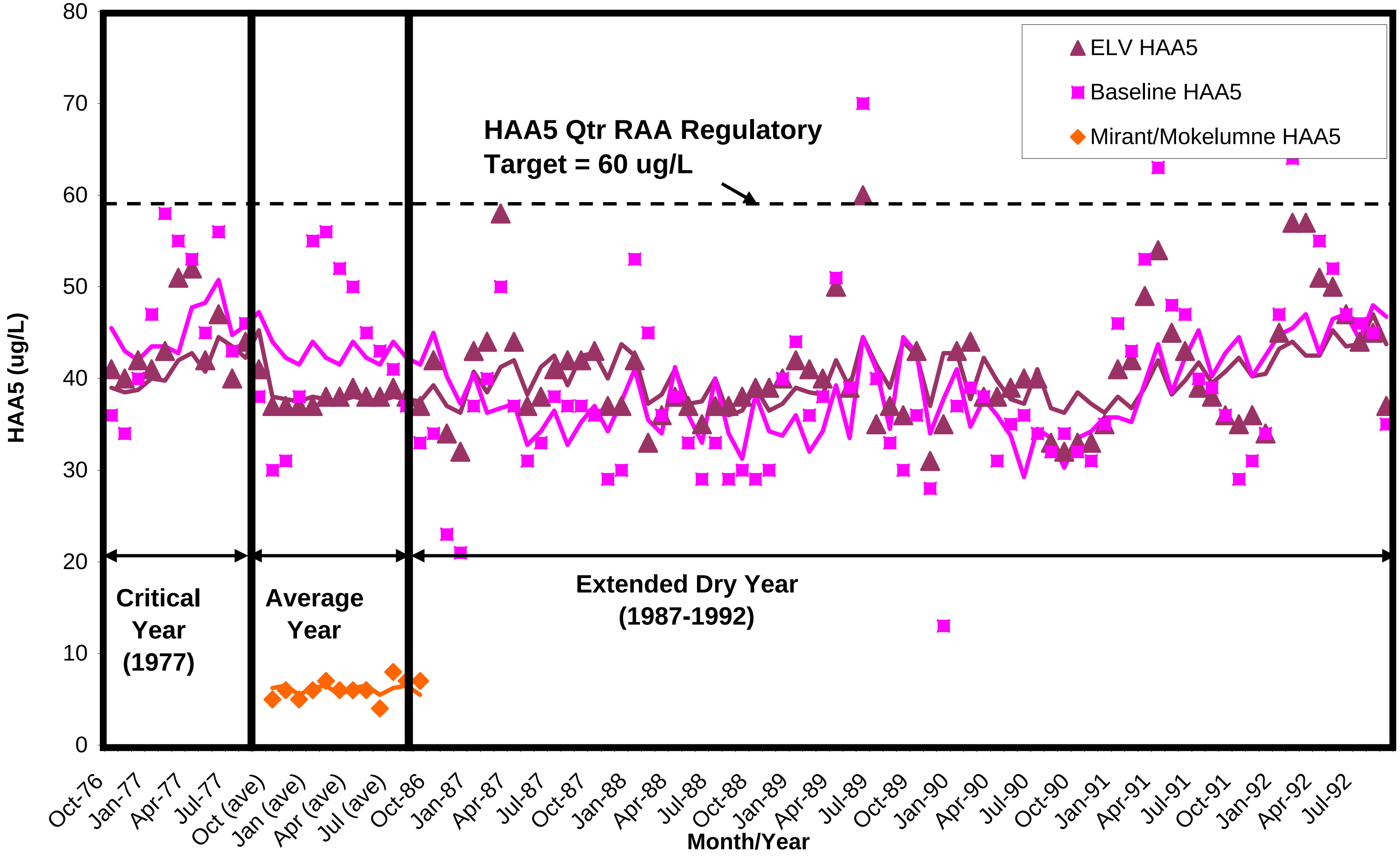


Note: Assumes a blend of Mirant and Mokelumne supplies. Supplies could be conveyed via a dedicated aqueduct, not considered in this evaluation. DBP projections assume settled water ozonation.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of Zone 7 Baseline HAA5 with Concept HAA5 (Conventional Treatment)

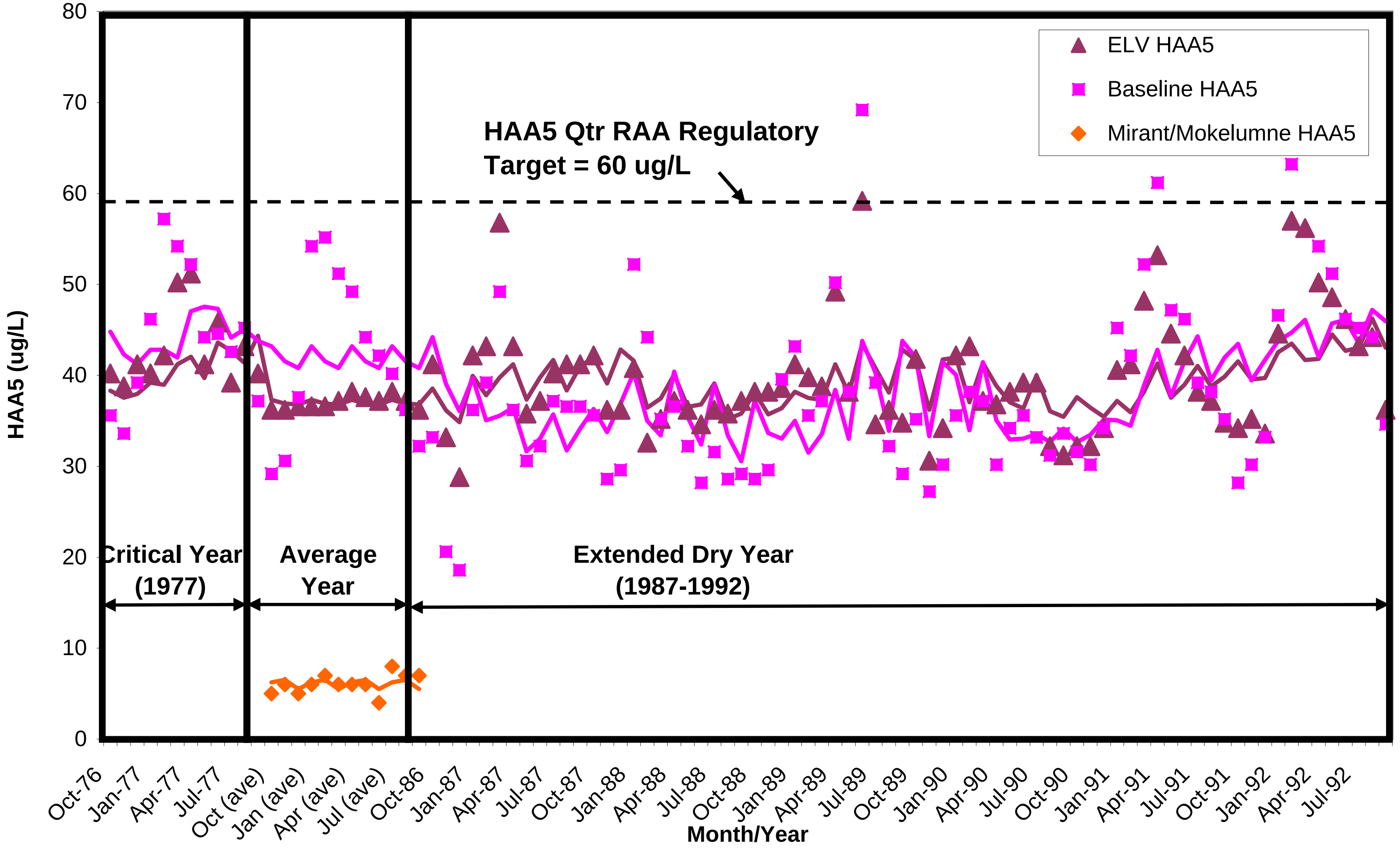


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment. Mirant/Mokelumne blend treated at EBMUD. This supply would be blended with Zone 7 treated water in the distribution system.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of Zone 7 Baseline HAA5 with Concept HAA5 (UF & Conventional Treatment)

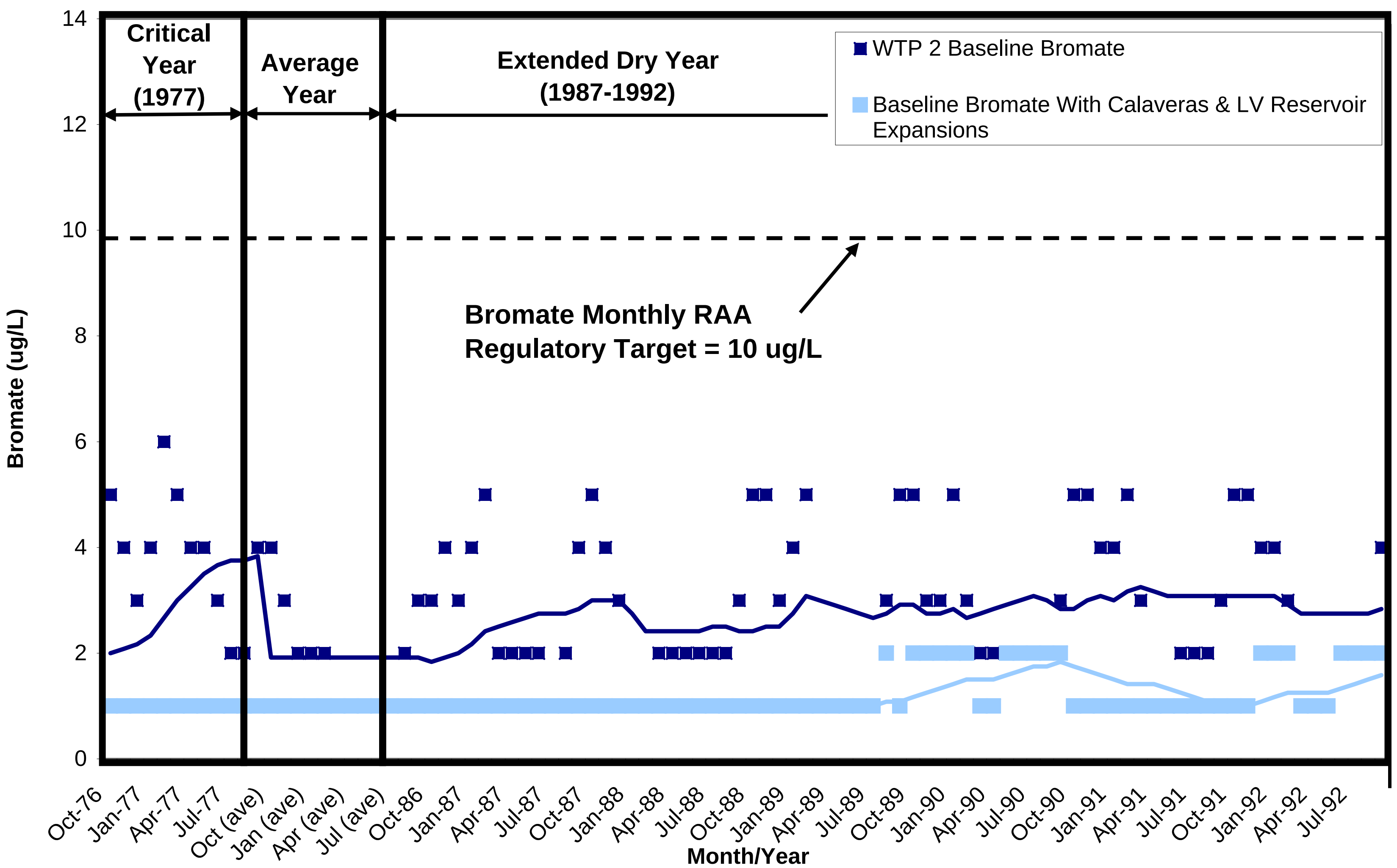


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 8:12 blend of UF:conventionally treated supplies. Mirant/Mokelumne blend treated at EBMUD. This supply would be blended with Zone 7 treated water in the distribution system.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of ACWD Baseline Bromate with Concept Bromate (WTP 2)

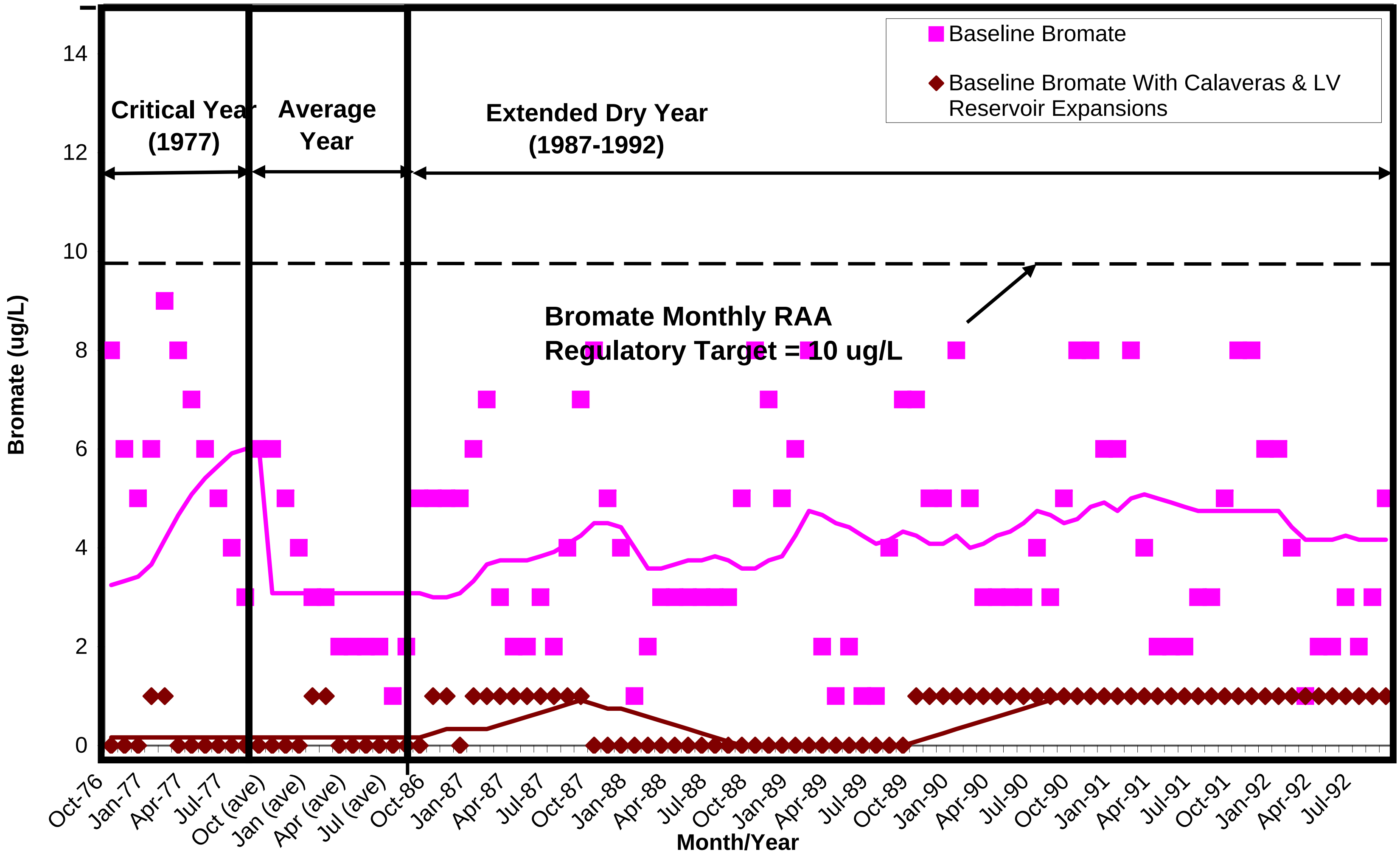


Note: The baseline bromate with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of SCVWD Baseline Bromate with Concept Bromate

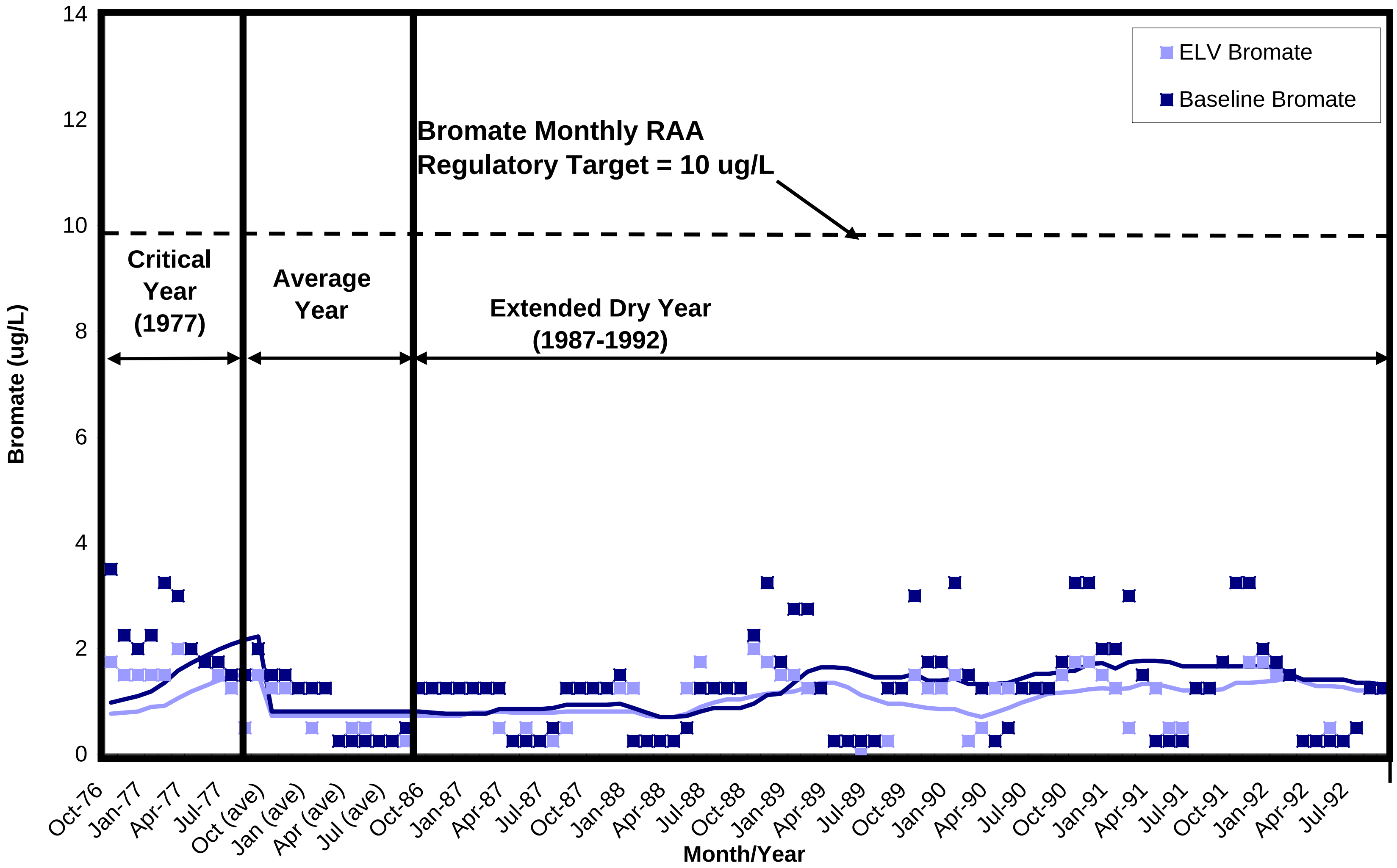


Note: The baseline bromate with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production for settled water ozonation.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of CCWD Baseline Bromate with Concept Bromate

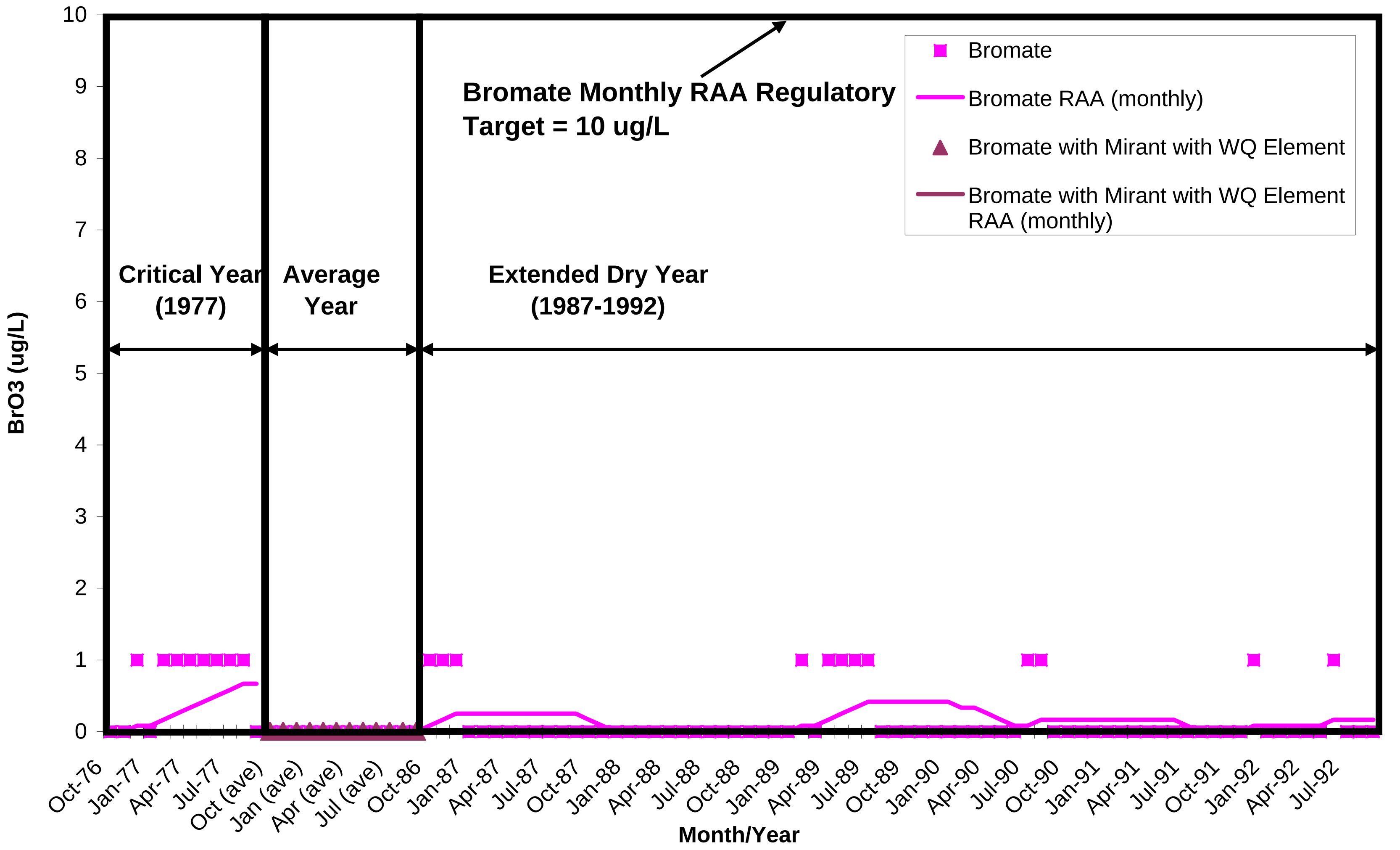


Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Example Portfolio: Maximize Water Quality

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WQ)
Mirant Desal with WQ Element

Comparison of EBMUD Baseline Bromate with Concept Bromate



Note: Assumes a blend of Mirant and Mokelumne supplies. Suplies may be conveyed via a dedicated aqueduct, not considered in this evaluation. DBP projections assume settled water ozonation.

G13 Maximize Water Supply Reliability with Storage Portfolio

G13 Example Portfolio: Maximize Water Supply with Storage

DESCRIPTION

The example Maximize Water Supply with Storage Portfolio includes seven concepts: Los Vaqueros Reservoir Expansion; the Calaveras Reservoir Expansion (maximize supply reliability operating scenario), the Regional Desalination Project, South Bay Desalination Concept, East Bay Saline Desalination Concept, Enhanced Conservation, and Recycled Water Concepts.

In this example portfolio, all concepts with dry-year supply benefits are included.

All seven participating agencies are anticipated to benefit from this portfolio. Additional information on each of the included concepts is provided below.

Maximize Water Supply with Storage Summary

Concepts Included:

- ☐ Los Vaqueros Reservoir Expansion
- ☐ Calaveras Reservoir Expansion (maximize water supply)
- ☐ Regional Desalination Project
- ☐ South Bay Desalination
- ☐ East Bay Saline Groundwater Desalination
- ☐ Enhanced Conservation
- ☐ Water Recycling

Extended Dry Year Supply .... Up to 221,000 AFY

Average Year Water Quality Supply ....Up to 24,000 AFY

Cost ($2005)

Capital Cost	TBD in future studies
O&M Cost	TBD in future studies
Unit Cost	TBD in future studies

Potential Owning Agency
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC, Zone 7

Potential Partners
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC(1), Zone 7

NOTE: Supply quantities exclude RDP and Enhanced Conservation

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

☐ *Los Vaqueros Reservoir Expansion*

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability Program (BAWQ&SRP), the multipurpose operating scenario for a 500,000 AF reservoir with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the BAWQ&SRP as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are Contra Costa Water District (CCWD), Alameda County Water District (ACWD), Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

☐ *Calaveras Reservoir Expansion (maximize water supply)*

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 AF up to 420,000 AF. An SFPUC study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. The BAWQ&SRP is evaluating potential facilities that would be required and operating scenarios that could be implemented if the reservoir were expanded to 420,000 AF. These scenarios and facilities are presented for illustrative purposes and do not represent future operating scenarios endorsed by the SFPUC nor do they represent a complete characterization of all facilities that may be required.

This example portfolio includes Calaveras Reservoir expansion with a dry-year supply reliability operational scenario. For this scenario, Hetch Hetchy water would be transferred into the expanded Calaveras Reservoir in average and wet years, and this water would stored for use during drought periods. Water would be delivered to the SFPUC system to meet dry-year demands, with deliveries to SCVWD via the SFPUC-SCVWD intertie, or via a new connection to the South Bay Aqueduct (SBA). If deliveries are via the SBA, both SCVWD and ACWD would receive a dry-year water quality benefit. This concept provides 53,000 AFY of dry-year supply reliability water to SFPUC (retail and wholesale customers), ACWD and SCVWD.

❑ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, that will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are CCWD, East Bay Municipal Utility District (EBMUD), SFPUC, and SCVWD. The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all-weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

❑ *South Bay Desalination Concept*

The South Bay Desalination concept could involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer. The upper aquifer is currently only used for small local domestic or agricultural purposes, or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control plant (WQCP) in Palo Alto. Each of these plants is assumed to have a treated water production capacity of up to 4 MGD. The end use for the desalinated supply could be for non-potable irrigation and industrial use, or for potable use. Two different target supply and water quality ranges have been selected, corresponding to the alternatives for end use. The capacity of 4 MGD is assumed for potable supply. However, due to recycled water supplies available for irrigation and industrial uses, demand for these purposes is lower, and production capacity is assumed to be 1 MGD per plant. This portfolio includes potable supply projects at all three sites, with a potential dry-year supply benefit of 13,000 AFY and an average year water quality benefit of 8,000 AFY. Water quality benefits were only assumed for concepts that could potentially offset SCVWD surface water or groundwater. Potential project beneficiaries include SCVWD, Bay Area Water Supply and Conservation Agency (BAWSCA), and SFPUC.

❑ *East Bay Saline Groundwater Desalination Project*

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD (treated production capacity) desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the saline portion of the Newark Aquifer. Water would be extracted through a series of bay-shore perimeter wells within ACWD's service district area. Finished water could be pumped directly into ACWD's distribution system or into SFPUC's Bay Division Pipelines 1& 2 in its regional transmission system. Concentrate discharge could potentially be disposed of by delivering it to the East Bay Discharge Authority (EBDA) discharge pipeline, several miles north of the project area, or other options to be identified and evaluated during project planning. This concept has a potential dry-year supply reliability and average year water quality benefit of up to 16,000 AFY. Potential beneficiaries are ACWD (dry-year supply and average year water quality), SFPUC (dry-year supply only for retail and wholesale customers), and SCVWD (details to be developed in future studies).

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SRP. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-1 - Supply Reliability Score Card

Performance	Baseline		Portfolio[1,2]		Baseline Plus Portfolio[1,2]		
Measure/Objective	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	Notes/Other
Meet Demands							
Critical Drought							SBA contractors, CCWD, and SFPUC (details to be developed infuture studies) are beneficiaries of the Los Vaqueros Reservoir Expansion concept. SFPUC, SCVWD, BAWSCA (as wholesale customers of SFPUC), and ACWD are potential beneficiaries of the Calaveras Reservoir Expansion. BAWSCA, SFPUC, and SCVWD are all listed as beneficiaries for the South Bay Desalination Concepts. Maximum concept yield is displayed for all agencies. SFPUC (and BAWSCA, as wholesale customers of SFPUC), SCVWD, EBMUD and CCWD will benefit from the Regional Desalination Project, though supply quantities and allocations are to be determined as par of the RDP. ACWD, BAWSCA, SCVWD (details to be determined in future studies) and SFPUC will benefit from the East Bay Saline Groundwater Desalination facility, though allocations have not been assumed and and maximum concept yield is displayed for all agencies. All participating agencies will benefit from Enhanced Conservation though no yield has been identified for that concept. Because some agencies consider recycled water yield as necessary for meeting baseline demand, potential yields from Recycled Water concepts have been included in the Portfolio Yield column, but not in the Baseline Plus Portfolio column. For Zone 7, yield is assumed to offset SBA supplies.
ACWD Supply[3]	20,600	AFY	Up to 80,919	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply	137,800	AFY	Up to 118,636	AFY	Up to 220,600	AFY	
CCWD Supply	176,800	AFY	Up to 32,520	AFY	176,800	AFY	
EBMUD Supply	200,430	AFY	Up to 15,366	AFY	200,430	AFY	
SCVWD Supply	39,400	AFY	Up to 151,992	AFY	Up to 97,800	AFY	
SFPUC Supply	157,000	AFY	Up to 137,056	AFY	Up to 239,800	AFY	
Zone 7 Supply (SWP)	38,900	AFY	Up to 6,890	AFY	38,900	AFY	
Total Supply[4]	633,130	AFY	Up to 249,549	AFY	Up to 785,697	AFY	
Extended Drought							
ACWD Supply[3]	25,500	AFY	Up to 75,933	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 118,636	AFY	Up to 292,700	AFY	
CCWD Supply	170,800	AFY	Up to 31,920	AFY	Up to 176,800	AFY	
EBMUD Supply	216,420	AFY	Up to 15,366	AFY	216,420	AFY	
SCVWD Supply	63,000	AFY	Up to 129,229	AFY	Up to 97,800	AFY	
SFPUC Supply	255,000	AFY	Up to 137,056	AFY	Up to 329,000	AFY	
Zone 7 Supply (SWP)	56,400	AFY	Up to 6,890	AFY	56,400	AFY	
Total Supply[4]	787,120	AFY	Up to 221,200	AFY	Up to 911,338	AFY	
Average Year							
ACWD Supply[3]	42,700	AFY	Up to 17,650	AFY	42,700	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 60,136	AFY	345,000	AFY	
CCWD Supply	139,400	AFY	Up to 22,520	AFY	Up to 161,920	AFY	
EBMUD Supply	255,590	AFY	Up to 15,366	AFY	255,590	AFY	
SCVWD Supply	97,800	AFY	Up to 43,994	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	Up to 54,256	AFY	329,000	AFY	
Zone 7 Supply (SWP)	71,400	AFY	Up to 6,890	AFY	71,400	AFY	
Total Supply[4]	935,890	AFY	Up to 121,282	AFY	Up to 958,410	AFY	
Vulnerability							
ACWD	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - East Bay Saline Groundwater Desalination provides separate connection point to ACWD if South Bay Aqueduct or SFPUC supply were interrupted. Locate West of Hayward fault, reducing vulnerability to earthquakes.				
BAWSCA Agencies	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - South Bay Desalination, East Bay Saline Groundwater Desalination, and potentially the Regional Desalination Project could provide small supply source to BAWSCA customers in the event of a supply disruption of imported supply.				
CCWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - South Bay Desalination concepts could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply, but only a small fraction of SCVWD customers could be served. Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply. Effect of East Bay Saline Groundwater Desalination on vulnerability will depend upon operating conditions, to be determined in future studies.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		Reduces Vulnerability - East Bay Saline Groundwater Desalination could provide small supply source to retail and wholesale customers in the event of a supply disruption on the Hetch Hetchy Aqueduct. Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption on the Hetch Hetchy Aqueduct, though supply quantities and conveyance mechanisms are to be determined by the RDP. South Bay Desalination could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption on the Hetch Hetchy Aqueduct, but only a small fraction of SFPUC customers could be served. Effect of Los Vaqueros Reservoir Expansion on vulnerability will depend upon operating conditions and will be determined in future studies.				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		No Effect on Vulnerability - Since concepts provide non-potable supplies or augment existing supplies, they do not reduce the vulnerability of Zone 7 potable system.				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - South Bay Desalination, RDP, East Bay Saline Groundwater Desalination, Water Recycling Concepts and Enhanced Conservation would be locally controlled. For Los Vaqueros Reservoir Expansion, a governing entity would be formed to represent the project beneficiaries to: 1) collect payments from participants; 2) enter into an operating agreement with CCWD for operations, maintenance and replacement; and 3) enter into water service and exchange agreements to provide an agreed-upon							

1. Supply quantities and allocations for the RDP facility(ies) are to be determined by the RDP, and are not included in these numbers.

2. Some agencies include recycled water supplies in future supply projections. As a result, recycled water has not been considered as an additional supply, and does not result in an increased total supply as compared to baseline.

3. ACWD baseline SWP supply numbers are based on SBA delivery information generated by internal District modeling conducted after the Los Vaqueros Expansion studies modeling used in this study. Los Vaqueros Reservoir Expansion concept supply quantities to all agencies, including ACWD, are based on Los Vaqueros Reservoir Expansion Studies modeling. Concept and Baseline plus Concept delivery quantities to ACWD reflect Los Vaqueros Expansion Studies modeling baseline supplies of 20,000, 30,000, and 34,900 AFY for critical dry, extended dry, and average years, as opposed to the District-furnished supply baselines of 20,600, 25,500 and 42,700 AFY, respectively.

4. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Table G13-2 - Public Health Protection Scorecard[1] (Page 1 of 2)

Performance Measure/Objective	Portfolio		Baseline Plus Portfolio		Notes
	Source Water	**Treated Water**	**Source Water**	**Treated Water**	
Variability for Treatment					
ACWD	Reduces Variability	NA	Reduces Variability	NA	East Bay Saline Groundwater Desalination Concept, Calaveras Reservoir Expansion and Los Vaqueros Reservoir Expansion will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	NA	NA	NA	BAWSCA receives treated supplies.
CCWD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Los Vaqueros Reservoi Expansion somewhat increases variability for treatment. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Calaveras and Los Vaqueros Reservoir Expansion concepts, South Bay Desalination and East Bay Saline Groundwater Desalination Concepts will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2,3]	NA	TBD[2,3]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Effect of Los Vaqueros Reservoir Expansion on variability for treatment will depend on operating conditions and will be developed in future studies.
Zone 7	Reduces Variability	NA	Reduces Variability	NA	Los Vaqueros Reservoir Expansion Concept reduces variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
Total Dissolved Solids					
ACWD	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Calaveras Reservoir Expansion, Los Vaqueros Reservoir Expansion, East Bay Saline Groundwater Desalination Concept will reduce TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Calaveras and Los Vaqueros Reservoir Expansions will reduce TDS. South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalination will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansion will not significantly affect TDS over all. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Calaveras and Los Vaqueros Reservoir Expansions will reduce TDS. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalination will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2,3]	TBD[2,3]	TBD[2,3]	TBD[2,3]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination will be treated to SFPUC TDS levels, and Calaveras Reservoir Expansion will have minimal effect on TDS. South Bay Desalinated supply for potable use will be treated to match existing TDS. Effect of Los Vaqueros Reservoir Expansion on TDS will depend on operating conditions and will be developed in future studies.
Zone 7	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Los Vaqueros Reservoir Expansion will reduce TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
Disinfection By-Products					
ACWD	NA	Reduces DBPs	NA	Reduces DBPs	Calaveras and Los Vaqueros Reservoir Expansions, East Bay Saline Groundwater Desalination Concept will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	Reduces DBPs	NA	Reduces DBPs	Calaveras and Los Vaqueros Reservoir Expansions, South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalination will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansion will have minimal effect on DBPs. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Calaveras and Los Vaqueros Reservoir Expansions, South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalination will reduce DBPs. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2,3]	TBD[2,3]	TBD[2,3]	TBD[2,3]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination and South bay Desalination will reduce DBPs. Effect of Los Vaqueros Reservoir Expansion on DBPs will depend on operating conditions and will be developed in future studies.
Zone 7	NA	Reduces DBPs	NA	Reduces DBPs	Los Vaqueros Reservoir Expansion will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part of the RDP.
3. Effect of SFPUC participation in the Los Vaqueros Expansion project to be determined in future studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-2 - Public Health Protection Scorecard [1] (Page 2 of 2)

Performance Measure/Objective	Portfolio		Baseline Plus Portfolio		Notes
	Source Water	Treated Water	Source Water	Treated Water	
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	Improves T&O	NA	Improves T&O	Calaveras and Los Vaqueros Reservoir Expansions, East Bay Saline Groundwater Desalination Concept will improve overall quality and taste and odor.
BAWSCA Agencies	NA	Improves T&O	NA	Improves T&O	Calaveras and Los Vaqueros Reservoir Expansions, South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalination will improve overall water quality and improve taste and odor.
CCWD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalination supply for potable use and East Bay Saline Groundwater Desalination will improve overall quality and taste and odor. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD^{2,3}	TBD^{2,3}	TBD^{2,3}	TBD^{2,3}	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination and South Bay Desalination concepts will slightly improve overall quality and taste and odor. Effect of Los Vaqueros Reservoir Expansion on taste and odor will depend on operating conditions and will be developed in future studies.
Zone 7	NA	NA	NA	Improves T&O	Los Vaqueros Reservoir Expansion will improve taste and odor. Recycled water projects are assumed to have no benefit or impact to potable water quality.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Calaveras and Los Vaqueros Reservoir Expansions, East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water quality from known contaminants (e.g., TDS).
BAWSCA Agencies	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Calaveras and Los Vaqueros Reservoir Expansions, East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water from known contaminants (e.g., TDS).
CCWD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	Los Vaqueros Reservoir Expansion is not expected to degrade taste and odor from known contaminants. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
EBMUD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
SCVWD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	Calaveras and Los Vaqueros Reservoir Expansions are not expected to degrade taste and odor from known contaminants. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use, East Bay Saline Groundwater Desalination, and recycled water supplies are not projected to degrade water quality from known contaminants (e.g., TDS).
SFPUC	TBD^{2,3}	TBD^{2,3}	TBD^{2,3}	TBD^{2,3}	Calaveras Reservoir Expansion is not expected to degrade taste and odor from known contaminants. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination, South Bay Desalination and recycled water concepts are not projected to degrade water quality from known contaminants (e.g., TDS). Effect of Los Vaqueros Reservoir Expansion on degradation potential will depend on operating conditions and will be developed in future studies.
Zone 7	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Los Vaqueros Reservoir Expansion is not expected to degrade taste and odor from known contaminants. Recycled water projects are not projected to degrade potable water quality from known contaminants.
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	TBD^{4}	TBD^{4}	TBD^{4}	TBD^{4}	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with advanced treatment, emerging contaminants including NDMA and pharmaceuticals may be introduced into the groundwater basin due to usage of recycled water. Emerging contaminants such as algal biotoxins may be a factor with desalinated bay and seawater supplies and the Calaveras Reservoir Expansion (increased potential for algal blooms in the expanded reservoir). Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.
BAWSCA Agencies	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	
CCWD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	
EBMUD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	
SCVWD	TBD^{2}	TBD^{2}	TBD^{2}	TBD^{2}	
SFPUC	TBD^{2,3}	TBD^{2,3}	TBD^{2,3}	TBD^{2,3}	
Zone 7	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part of the RDP.
3. Effect of SFPUC participation in the Los Vaqueros Expansion project to be determined in future studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-2a - Public Health Protection Score Card by Agency

Agency: ACWD

			Agency Baseline			**Concept: East Bay Saline Groundwater Desalination[1]**		**Baseline Plus Portfolio**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**Agency Baseline Plus Los Vaqueros and Calaveras Expansion Source Water**	**Agency Baseline Plus Los Vaqueros and Calaveras Expansion Treated Water (MSJWTP)**	**Agency Baseline Plus Los Vaqueros and Calaveras Expansion Treated Water (WTP2)**	**Notes**
Supply Quantity											
Critical Year		AFY	20,600			16,000		42,700			
Extended Dry Year		AFY	25,500			16,000		42,700			
Average Year		AFY	42,700			16,000		42,700			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 -0.53	0.12 -0.41	0.15 -0.48	NA	0.02	0.07 - 0.08	0.05 - 0.05	0.06 - 0.08	
	Mean	mg/L	0.37	0.28	0.33	NA	0.02	0.07	0.05	0.06	
TOC	Range	mg/L	3.4 -7.3	2.9 -6.4	2.3 -5.5	NA	0.1	2.7 - 3.1	2.3 - 2.6	1.8 - 2.1	
	Mean	mg/L	5.1	4.4	3.7	NA	0.1	2.9	2.5	1.9	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 -0.51	0.03 -0.41	0.04 -0.47	NA	0.02	0.04 - 0.13	0.03 - 0.10	0.04 - 0.11	
	Mean	mg/L	0.26	0.20	0.23	NA	0.02	0.10	0.07	0.08	
TOC	Range	mg/L	1.6 -7.3	1.3 -6.4	0.9 -5.5	NA	0.1	2.3 - 5.4	1.9 - 4.7	1.5 - 3.9	
	Mean	mg/L	3.7	3.2	2.6	NA	0.1	3.1	2.6	2.1	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	seasonal
Average Year											
Bromide	Range	mg/L	0.08 -0.38	0.05 -0.31	0.07 -0.35	NA	0.02	0.07 - 0.08	0.07 - 0.11	0.09 - 0.13	
	Mean	mg/L	0.19	0.14	0.17	NA	0.02	0.07	0.09	0.11	
TOC	Range	mg/L	2.8 -5.9	2.4 -5.1	1.9 -4.3	NA	0.1	2.7 - 3.1	2.7 - 2.7	2.2 - 2.2	
	Mean	mg/L	4.0	3.4	2.8	NA	0.1	2.9	2.7	2.2	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 -704	298 -727	307 -736	NA	40	137 - 156	159 - 178	168 - 187	
	Mean	mg/L	507	529	561	NA	40	144	166	197	
Extended Dry Year	Range	mg/L	166 -675	188 -697	197 -706	NA	40	109 - 215	131 - 238	140 - 247	
	Mean	mg/L	384	406	438	NA	40	173	196	227	
Average Year	Range	mg/L	180 -528	202 -550	211 -559	NA	40	137 - 156	159 - 178	168 - 187	
	Mean	mg/L	296	319	350	NA	40	144	166	197	
Disinfection Byproducts											
Critical Year											
Bromate	Range	mg/L	NA	ND -ND	2 -6	NA	ND	NA	ND - ND	1 - 1	
	Mean	mg/L	NA	ND	4	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	82 -153	26 -42	NA	ND	NA	58 - 65	19 - 20	
	Mean	mg/L	NA	110	33	NA	ND	NA	62	19	
HAA5	Range	mg/L	NA	47 -75	16 -21	NA	1	NA	49 - 53	17 - 18	
	Mean	mg/L	NA	61	19	NA	1	NA	52	18	
Extended Dry Year											
Bromate	Range	mg/L	NA	ND -ND	1 -5	NA	ND	NA	ND - ND	1 - 1	
	Mean	mg/L	NA	ND	3	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	50 -142	16 -38	NA	ND	NA	50 - 102	17 - 29	
	Mean	mg/L	NA	83	26	NA	ND	NA	65	20	
HAA5	Range	mg/L	NA	22 -92	11 -26	NA	1	NA	34 - 81	15 - 25	
	Mean	mg/L	NA	52	17	NA	1	NA	51	18	
Average Year											
Bromate	Range	mg/L	NA	ND -ND	1 -4	NA	ND	NA	ND - ND	1 - 2	
	Mean	mg/L	NA	ND	2	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	68 -116	21 -33	NA	ND	NA	68 - 71	21 - 23	
	Mean	mg/L	NA	85	26	NA	ND	NA	70	22	
HAA5	Range	mg/L	NA	41 -74	14 -22	NA	1	NA	50 - 53	17 - 18	
	Mean	mg/L	NA	57	19	NA	1	NA	51	18	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal	NA	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-2b - Public Health Protection Score Card by Agency

Agency: SCVWD

			Agency Baseline		**Concept: East Bay Saline Groundwater Desalination[1]**		**Concept: South Bay Desalination (Potable)[2]**		**Concept: South Bay Desalination (Irrigation)[3]**		**Baseline Plus Portfolio**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination Potable Use Treated Water**	**South Bay Desalination (Non-Potable) Source Water**	**South Bay Desalination (Non-Potable) Treated Water**	**Los Vaqueros and Calaveras Expansions plus Agency Baseline**	**Los Vaqueros and Calaveras Expansions plus Agency Baseline**	**Notes**
Supply Quantity													
Critical Year		AFY	39,400		16,000		13,800		3,200		97,800		
Extended Dry Year		AFY	63,000		16,000		13,800		3,200		97,800		
Average Year		AFY	97,800		16,000		8,300		3,200		97,800		
Variability for Treatment													
Critical Year													
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.07 - 0.08	0.06 - 0.07	
	Mean	mg/L	0.37	0.33	NA	0.02	NA	0.08	NA	0.17	0.07	0.06	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	2.7 - 3.1	1.8 - 2.8	
	Mean	mg/L	5.1	3.9	NA	0.1	NA	0.6	NA	1.2	2.9	2.6	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year													
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.04 - 0.13	0.03 - 0.11	
	Mean	mg/L	0.26	0.24	NA	0.02	NA	0.08	NA	0.17	0.10	0.08	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	2.3 - 5.4	1.5 - 5.0	
	Mean	mg/L	3.7	2.7	NA	0.1	NA	0.6	NA	1.2	3.1	2.6	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Average Year													
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.07 - 0.08	0.09 - 0.13	
	Mean	mg/L	0.19	0.17	NA	0.02	NA	0.08	NA	0.17	0.07	0.11	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	2.7 - 3.1	0.3 - 2.3	
	Mean	mg/L	4.0	3.0	NA	0.1	NA	0.6	NA	1.2	2.9	2.1	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids													
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	40	NA	40 - 280	NA	290 - 500	137 - 156	157 - 176	
	Mean	mg/L	507	527	NA	40	NA	160	NA	395	144	163	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	40	NA	40 - 280	NA	290 - 500	109 - 215	128 - 235	
	Mean	mg/L	384	404	NA	40	NA	160	NA	395	173	193	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	40	NA	40 - 280	NA	290 - 500	137 - 156	157 - 176	
	Mean	mg/L	296	316	NA	40	NA	160	NA	395	144	163	
Minimize Disinfection Byproducts													
Critical Year													
Bromate	Range	mg/L	NA	3 - 9	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	6	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	27 - 44	NA	ND	NA	1 - 6	NA	6 - 11	NA	19 - 28	
	Mean	mg/L	NA	34	NA	ND	NA	1	NA	6	NA	26	
HAA5	Range	mg/L	NA	11 - 14	NA	1	NA	2 - 7	NA	7 - 11	NA	11 - 16	
	Mean	mg/L	NA	13	NA	1	NA	2	NA	7	NA	16	
Extended Dry Year													
Bromate	Range	mg/L	NA	1 - 8	NA	ND	NA	ND	NA	ND - ND	NA	ND - 2	
	Mean	mg/L	NA	4	NA	ND	NA	ND	NA	ND	NA	1	
THM4	Range	mg/L	NA	16 - 40	NA	ND	NA	1 - 6	NA	6 - 11	NA	17 - 38	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	NA	26	
HAA5	Range	mg/L	NA	7 - 18	NA	1	NA	2 - 7	NA	7 - 11	NA	10 - 21	
	Mean	mg/L	NA	11	NA	1	NA	2	NA	7	NA	15	
Average Year													
Bromate	Range	mg/L	NA	1 - 6	NA	ND	NA	ND	NA	ND - ND	NA	2 - 3	
	Mean	mg/L	NA	3	NA	ND	NA	ND	NA	ND	NA	2	
THM4	Range	mg/L	NA	22 - 34	NA	ND	NA	1 - 6	NA	6 - 11	NA	22 - 23	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	NA	23	
HAA5	Range	mg/L	NA	9 - 15	NA	1	NA	2 - 7	NA	7 - 11	NA	11 - 12	
	Mean	mg/L	NA	12	NA	1	NA	2	NA	7	NA	12	
Minimize Taste and Odor													
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	improved overall quality	improved T&O	
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	NA	NA	minimal likelihood	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.
2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.
3. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-2c - Public Health Protection Score Card by Agency

Agency: SFPUC

			Agency Baseline		Concept: East Bay Saline Groundwater Desalination[1]		Concept: South Bay Desalination (Potable)[2]		Concept: South Bay Desalination (Irrigation) Non-potable[3]		Baseline Plus Portfolio		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SFPUC Source Water**	**SFPUC Treated Water**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination (Potable) Treated Water**	**South Bay Desalination (Non-Potable) Source Water**	**South Bay Desalination (Non-Potable) Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity													
Critical Year		AFY	157,000		16,000		13,800		3,200		239,800		
Extended Dry Year		AFY	255,000		16,000		13,800		3,200		329,000		
Average Year		AFY	329,000		0		0		3,200		329,000		
Variability for Treatment													
Critical Year													
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.01 - 0.03	0.01 - 0.01	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	1.4 - 3.1	1.4 - 2.7	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	2.0	1.9	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year													
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.01 - 0.04	0.01 - 0.03	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	1.4 - 3.4	1.4 - 3.0	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	1.9	1.8	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Average Year													
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.01 - 0.03	0.01 - 0.01	
	Mean	mg/L	0.01	0.01	NA	0.02	NA	0.08	NA	0.17	0.02	0.01	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.1	NA	2.7 - 3.1	NA	0.9 - 1.5	1.5 - 2.8	1.2 - 1.7	
	Mean	mg/L	1.7	1.6	NA	0.1	NA	2.9	NA	1.2	2.0	1.4	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids													
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40	NA	40 - 280	NA	290 - 500	16 - 45	32 - 61	
	Mean	mg/L	26	26	NA	40	NA	160	NA	395	31	47	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40	NA	40 - 280	NA	290 - 500	16 - 98	32 - 114	
	Mean	mg/L	42	42	NA	40	NA	160	NA	395	39	55	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40	NA	40 - 280	NA	290 - 500	30 - 82	46 - 98	
	Mean	mg/L	40	40	NA	40	NA	160	NA	395	52	68	
Disinfection Byproducts													
Critical Year													
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	34 - 47	NA	ND	NA	1 - 6	NA	6 - 11	NA	30 - 39	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	NA	34	
HAA5	Range	mg/L	NA	28 - 40	NA	1	NA	2 - 7	NA	7 - 11	NA	25 - 32	
	Mean	mg/L	NA	32	NA	1	NA	2	NA	7	NA	29	
Extended Dry Year													
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	33 - 50	NA	ND	NA	1 - 6	NA	6 - 11	NA	30 - 43	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	NA	35	
HAA5	Range	mg/L	NA	24 - 44	NA	1	NA	2 - 7	NA	7 - 11	NA	24 - 39	
	Mean	mg/L	NA	30	NA	1	NA	2	NA	7	NA	28	
Average Year													
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	24 - 43	NA	ND	NA	1 - 6	NA	6 - 11	NA	24 - 44	
	Mean	mg/L	NA	33	NA	ND	NA	1	NA	6	NA	34	
HAA5	Range	mg/L	NA	22 - 34	NA	1	NA	2 - 7	NA	7 - 11	NA	20 - 35	
	Mean	mg/L	NA	28	NA	1	NA	2	NA	7	NA	27	
Taste and Odor													
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	No change	No change	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	NA	likelihood	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.
2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average
3. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-2d - Public Health Protection Score Card by Agency

Agency: Zone 7

			Agency Baseline			**Baseline Plus Portfolio**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Los Vaqueros and Calaveras Expansions plus Agency Baseline Source Water**	**Los Vaqueros and Calaveras Expansions plus Agency Baseline Treated Water (PPWTP)**	**Los Vaqueros and Calaveras Expansions plus Agency Baseline Treated Water (DVWTP)**	**Notes**
Supply Quantity									
Critical Year		AFY	38,900			38,900			Zone 7 is not interested in additional dry year supply. Any water taken from concepts would offset SBA supplies.
Extended Dry Year		AFY	56,400			56,400			
Average Year		AFY	71,400			71,400			
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	0.13 - 0.20	0.12 - 0.20	0.13 - 0.20	
	Mean	mg/L	0.37	0.30	0.30	0.16	0.14	0.16	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	3.2 - 4.3	2.7 - 3.9	3.2 - 4.3	
	Mean	mg/L	5.1	4.5	4.7	3.6	3.1	3.6	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	0.05 - 0.44	0.08 - 0.34	0.05 - 0.44	
	Mean	mg/L	0.26	0.21	0.21	0.18	0.17	0.18	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	2.4 - 6.3	2.1 - 6.3	2.4 - 6.3	
	Mean	mg/L	3.7	3.4	3.4	3.5	3.2	3.5	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	0.11 - 0.11	0.11 - 0.13	0.11 - 0.11	
	Mean	mg/L	0.19	0.15	0.15	0.11	0.12	0.11	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	3.2 - 3.2	2.6 - 2.6	2.7 - 3.1	
	Mean	mg/L	4.0	3.7	3.7	3.2	2.6	2.9	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	227 - 306	237 - 316	237 - 316	
	Mean	mg/L	507	517	517	259	269	269	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	166 - 601	175 - 610	175 - 610	
	Mean	mg/L	384	394	394	285	295	295	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	196 - 203	206 - 213	206 - 213	
	Mean	mg/L	296	306	306	200	210	210	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	ND	ND	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	55 - 75	57 - 73	
	Mean	ug/L	NA	86	89	NA	62	63	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	37 - 45	37 - 45	
	Mean	ug/L	NA	44	46	NA	40	40	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	ND	ND	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	46 - 101	47 - 103	
	Mean	ug/L	NA	67	67	NA	61	62	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	27 - 65	28 - 70	
	Mean	ug/L	NA	39	39	NA	39	39	
Average Year									
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	ND	ND	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	54 - 55	55 - 55	
	Mean	ug/L	NA	68	69	NA	54	55	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	37 - 38	38 - 39	
	Mean	ug/L	NA	43	43	NA	37	38	
Taste and Odor									
Source of water	Qual		NA	NA	NA	improved overall quality	improved overall quality	improved overall quality	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	minimal likelihood	minimal likelihood	minimal likelihood	Potential reservoir mixing issues

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-2e - Public Health Protection Score Card by Agency

Agency: CCWD

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline		Baseline Plus Portfolio		Notes
			CCWD Source Water	Agency Treated Water[1]	Los Vaqueros Expansion plus Agency Baseline Source Water	Los Vaqueros Expansion plus Agency Baseline Treated Water[1]	
Supply Quantity							
Critical Year		AFY	176,800		176,800		
Extended Dry Year		AFY	170,800		176,800		
Average Year		AFY	139,400		161,920		
Minimize Variability for Treatment							
Critical Year							
Bromide	Range	mg/L	0.22 - 0.66	0.16 - 0.58	0.15 - 0.39	0.10 - 0.31	
	Mean	mg/L	0.43	0.35	0.26	0.20	
TOC	Range	mg/L	2.6 - 5.4	1.8 - 4.2	3.1 - 6.1	2.2 - 4.8	
	Mean	mg/L	4.0	3.0	3.9	2.9	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Extended Dry Year							
Bromide	Range	mg/L	0.04 - 0.65	0.03 - 0.57	0.04 - 0.62	0.03 - 0.54	
	Mean	mg/L	0.25	0.20	0.19	0.14	
TOC	Range	mg/L	2.2 - 7.6	1.4 - 6.1	2.2 - 7.6	1.4 - 6.1	
	Mean	mg/L	3.8	2.7	3.7	2.7	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Average Year							
Bromide	Range	mg/L	0.07 - 0.27	0.05 - 0.22	0.06 - 0.22	0.03 - 0.17	
	Mean	mg/L	0.17	0.12	0.14	0.10	
TOC	Range	mg/L	2.7 - 6.3	1.8 - 4.9	2.7 - 6.4	1.8 - 5.0	
	Mean	mg/L	3.7	2.7	3.8	2.8	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Minimize Total Dissolved Solids							
Critical Year	Range	mg/L	334 - 856	355 - 877	245 - 532	266 - 554	
	Mean	mg/L	580	601	384	405	
Extended Dry Year	Range	mg/L	159 - 842	181 - 863	158 - 812	179 - 834	
	Mean	mg/L	370	392	299	321	
Average Year	Range	mg/L	176 - 398	198 - 419	168 - 331	189 - 352	
	Mean	mg/L	273	295	243	265	
Minimize Disinfection Byproducts							
Critical Year							
Bromate	Range	ug/L	NA	2 - 4	NA	1 - 2	
	Mean	ug/L	NA	2	NA	2	
THM4	Range	ug/L	NA	54 - 82	NA	55 - 84	
	Mean	ug/L	NA	68	NA	63	
HAA5	Range	ug/L	NA	19 - 26	NA	22 - 28	
	Mean	ug/L	NA	23	NA	24	
Extended Dry Year							
Bromate	Range	ug/L	NA	0.3 - 3	NA	ND - 3	
	Mean	ug/L	NA	1	NA	1	
THM4	Range	ug/L	NA	41 - 92	NA	42 - 87	
	Mean	ug/L	NA	60	NA	57	
HAA5	Range	ug/L	NA	18 - 33	NA	19 - 34	
	Mean	ug/L	NA	25	NA	25	
Average Year							
Bromate	Range	ug/L	NA	0.3 - 2	NA	0.3 - 1	
	Mean	ug/L	NA	1	NA	1	
THM4	Range	ug/L	NA	48 - 79	NA	44 - 75	
	Mean	ug/L	NA	57	NA	55	
HAA5	Range	ug/L	NA	21 - 31	NA	21 - 32	
	Mean	ug/L	NA	25	NA	26	
Minimize Taste and Odor							
Source of water	Qual		NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal likelihood	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Assumes 75% Bollman, 25% Randall Bold blend.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	Portfolio Rating	
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Los Vaqueros Reservoir Expansion: CALFED Los Vaqueros Expansion Studies (CALFED, 2004) project capital costs of $1290 M and operating costs of $27.5 M ($2008). Calaveras capital costs are estimated at $426 M, with operating costs estimated as $3.5 M per year ($2003). Calaveras Reservoir Expansion: Capital costs for the Calaveras Reservoir Expansion include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing station. Pumping costs estimated as $3.5 M/year. All costs in $2003. Operating costs and annualized costs to be determined as part of future SFPUC studies. Regional Desalination Project: Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. East Bay Saline Groundwater Desalination: East Bay Saline Groundwater Desalination facilities are estimated as $75 million ($2005). South Bay Desalination: South Bay Desalination facility capital costs are estimated at $14 to $138 million, and O&M costs at $3 to $10 million ($2005), depending on selected water quality targets. Water Recycling: Recycled water capital costs are estimated as $839 million ($2005). Enhanced Conservation: No cost estimates are available for Enhanced Conservation.
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	Allocation of Costs will not be determined as part of this study.
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): High Impact.** The overall impact of the two reservoir expansions in combination with other projects (excluding the RDP) would be high, and thus outweigh the not-yet-determined potential impacts of the RDP. Overall impacts associated with reservoir expansion would include effects to biological resources from inundation. The level of impact associated with the RDP is not known but would depend on the location and operations of the facility. In general, if the RDP is sited in an area of sensitive habitat and would require construction and operation of a surface water intake, potential adverse effects to aquatic and wetland resources would occur. In addition, brackish and seawater desalination plants consumes large amount of energy. Depending on the location of other facilities (e.g., recycling plant, conveyance facilities, interties), potential effects to biological resources could occur; however, these facilities would be located in disturbed areas to the extent feasible, thus reducing their potential for adverse impacts. The South Bay Desalination plants would unlikely affect biological resources as they would be located in existing, disturbed areas. **Overall Impacts to the Environment (After Mitigation): TBD[1].** Mitigation opportunities would be developed to reduce high impacts to the environment. For both reservoir expansions, the mitigation strategy includes protection, restoration, and enhancement of existing watershed lands and other lands. For the RDP, mitigation opportunities would depend on the location, but could include the design of the water intake with state-of-the-art screens to reduce entrainment/impingement of aquatic resources, use of energy recovery devices or participation in PG&E voluntary programs to reduce energy consumption, and administration of relevant studies on the potential effects to aquatic resources. In general, mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources for all portfolio facilities include, but are not limited to, alternative siting of facilities to avoid sensitive resources, preconstruction surveys, implementation of standard BMPs, restriction on construction schedule, monitoring, and if necessary, acquisition of regulatory permits and implementation of regulatory permit conditions.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): High Benefits.** ELV would be considered a benefit to Delta resources because it would reduce direct fish losses from water diversions through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). The benefits associated with the RDP would depend on the location and operation of the desalination facilities. If any of the concept reduces spring pumping from the Delta (e.g., East Bay Desalination), there would be environmental benefits to the Delta. Reuse of water through water recycling and conservation are considered a benefit to the environment because it reduces demand for new water supplies, and thus construction- and operation-related effects on the environment. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Mitigation acreage requirements for ELV would range from 1,953 to 8,576 acres, thus increasing the amount of overall protected, enhanced, or restored habitat. Other benefits would be associated with additional mitigation acreage resulting from the Calaveras Reservoir expansion.	
Implementation Potential		
External Support	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
Consistency with Local and Regional Plans	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	7	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	6,300,000 people	

1. To be determined in future studies.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-4 - Environmental Score Card (Page 1 of 2)

Performance Measure/Objective	Portfolio Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** ELV would reduce direct fish losses from water diversions through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield), and thus would be considered a benefit. However, expansion of Calaveras Reservoir would result in inundation of aquatic resources (affect upstream perennial & intermittent streams) including Arroyo Hondo and Calaveras Creek. In addition, concept development may affect steelhead restoration within the Alameda Creek Watershed. Impacts to aquatic environment from the location and operations of the RDP have not been determined. Potential long-term, adverse effects to aquatic resources associated with operation of the desalination plant using surface water intakes occur from entrainment and impingement, and discharge of brine. Brine discharge from the RDP would likely be combined with either wastewater effluent or blow-down water from the power plant; adverse effects would unlikely occur if the combined brine discharge complies with NPDES standards. Operational impacts to aquatic resources are not expected from the East Bay Saline Groundwater and South Bay Desalination concepts, as these facilities would use groundwater as the source water (thus eliminating potential effects to surface aquatic resources). Brine from these facilities would be combined with effluent or power plant blow-down water such that the brine would be mixed and diluted prior to discharge. If the East Bay Desalination supply offsets SBA supply during normal years, there may be a reduction in spring and summer pumping from the Delta and thus benefits to Delta resources. Other minor potential effects on the aquatic environment are associated with improperly treated reclaimed water being discharged into biological sensitive areas (for recycling concepts), and general construction activities that could increase stormwater runoff to nearby creeks and drainages, and thus affect aquatic resources (for all concepts). **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies. In addition, continue trout planting. Mitigation opportunities for the RDP would depend on its location, and could include, but not be limited to, design of the intake with state-of-the-art screens and administration of relevant studies on the potential effects to aquatic resources. For the RDP, where sensitive resources would be affected, then the following would apply: consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Mitigation opportunities for potential impacts on sensitive biological resources from operation of recycling facilities include compliance with Title 22 requirements for treatment standards. General mitigation opportunities to reduce short-term construction effects (for all concepts) include, but are not limited to, implementation of standard BMPs (e.g., sediment and erosion control), and restriction on construction schedule (e.g,. avoid construction activities in creeks during the wet season).
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Construction and Operation of ELV would affect approximately 2,500 acres of terrestrial habitats, including: grassland, oak woodland, upland scrub, riparian, urban-ruderal, and agriculture. Impacts to the terrestrial environment from development of all other concepts would depend on the location of the facilities. South Bay Desalination treatment facilities would be located on existing, disturbed areas (e.g., power plants or the WQCP) and is not expected to result in adverse effects to terrestrial resources. Where facilities are not known (e.g., RDP, East Bay Saline Groundwater Desalination facilities, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to sensitive terrestrial habitat could occur if facilities are located on these resources. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities for long-term effects to the terrestrial environment would be avoidance of sensitive terrestrial habitat to the extent possible through alternative siting. For ELV, the mitigation strategy includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres. For Calaveras Reservoir expansion, a mitigation strategy that provides for resource restoration or enhancement in and around the watershed would be implemented (replacement ratios of loss habitat may be 3:1 or as deemed appropriate by the regulatory agency). The protection, restoration, and/or enhancement of land from implementation of both reservoir expansions would be a benefit. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations. General mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources include, but are not limited to, implementation of standard BMPs (e.g., fence sensitive terrestrial habitats to ensure avoidance), and acquisition of regulatory permits and compliance with permit conditions.

Example Portfolio: Maximize Supply Reliability with Storage

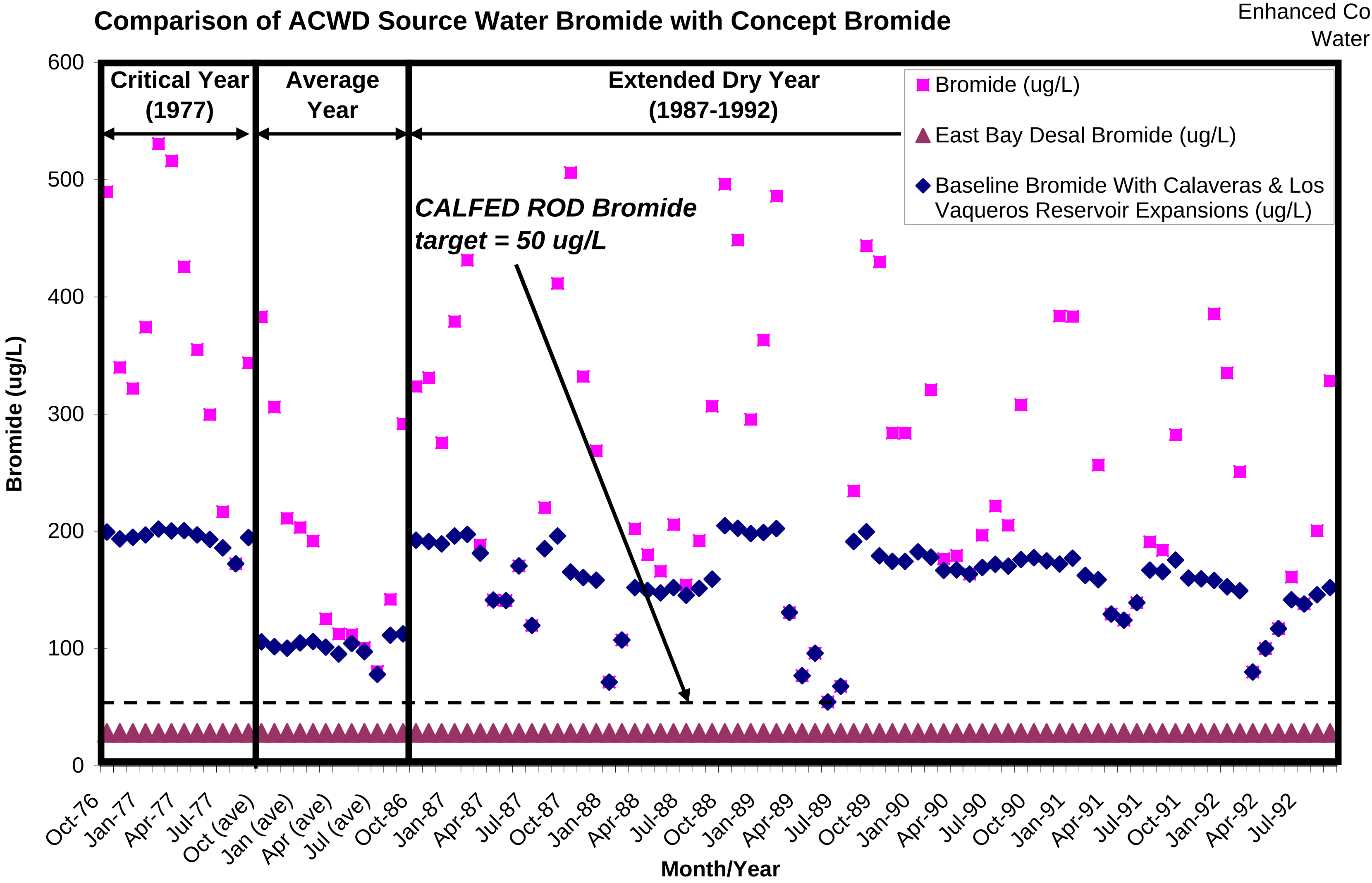
Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G13-4 - Environmental Score Card (Page 2 of 2)

Performance Measure/Objective	Portfolio Rating
Wetlands	
Potential Impacts to Wetland Resources (acreage affected, mitigation)	**Effects on Wetlands (Before Mitigation): Impacts.** Expansion of Los Vaqueros Reservoir would result in inundation of 1.3 acres of wetlands habitat. Expansion of Calaveras Reservoir would result in inundation of wetlands habitat. Impacts to wetland resources from other facilities development would depend on the location of the individual concept facilities. Although the location of the RDP has not been determined, potential wetlands could be adversely affected if the plant or intake pipelines occur through wetlands. The South Bay Desalination plants would be located within existing, disturbed areas (e.g., power plant, WQCP). Recycled water project facilities have not yet been determined but would likely be located in disturbed areas to avoid wetland resources to the extent feasible. A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of conveyance facilities and interties for all concepts may temporarily affect wetland resources (e.g., creek crossing). **Effects on Wetlands (After Mitigation): No Effect.** For LVE, the mitigation strategy identified for Terrestrial Resources, above, would also apply to impacts on wetlands. In general, mitigation opportunities to reduce adverse effects to wetland resources would be avoidance to the extent possible through alternative siting. If wetlands resources are affected (for Calaveras Reservoir expansion and other facilities), they would typically be replaced at a ratio of 3:1 or at a ratio deemed appropriate by regulatory agencies. Consultation with regulatory agencies, permit acquisition, and compliance with permit conditions would be required. For Calaveras Reservoir Expansion, enhancement and restoration could occur in and around the watershed. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations. General mitigation opportunities to reduce short-term construction and potentially long-term effects to wetland resources include, but are not limited to, delineation of wetlands, implementation of standard BMPs (e.g., installation of silt fence to prevent runoff into wetlands), restriction on construction schedule (limit construction through creeks during dry seasons only), and monitoring.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts. I**mpacts to special-status plant and wildlife species from development of all concepts would depend on the habitat affected, which is determined by the location of the concept facilities. Expansion of Los Vaqueros Reservoir could affect the following species: San Joaquin kit fox, California red-legged frog, California tiger salamander, Western pond turtle, Bald eagle, Curved-foot hygrotis diving beetle, Mason's lilaeopsis, Alkali milk-vetch, Heartscale, Brittlescale, San Joaquin spearscale, Recurved Larkspur, Contra Costa goldfields, Vernal pool fairly shrimp, etc. Expansion of Calaveras Reservoir could affect the following species: Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. As described above, the location of the RDP has not been determined; construction and operation of a desalination plant (including a surface water intake and discharge of brine) may affect special-status fisheries or other plant and wildlife species associated with wetlands habitat. The South Bay Desalination plants would be located in disturbed areas (e.g., power plant, WQCP), and effects to special-status species are unlikely. Where facilities are not known (e.g., East Bay Saline Groundwater Desalination plant a groundwater wells, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to special- status species could occur if facilities are located within or adjacent to habitat for these species. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Special-Status Species (After Mitigation): No Effect.** For ELV and Calaveras Reservoir expansion, the mitigation strategy identified for Terrestrial Resources, above, would also apply to impacts on special-status species. Mitigation opportunities for effects to special-status species would be avoidance of sensitive habitats to the extent possible, or acquisition of regulatory permits and implementation of regulatory permit conditions if impacts occur. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations. In addition, general mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., construction during non-nesting or -breeding season).
Energy Consumption	
Potential Increases In Energy Consumption (amount of energy required for operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** All facilities would consume energy. Pollutant emissions would be associated with energy production. Due to the size and energy requirement of the RDP, it would result in the most energy consumption. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** For ELV, further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants. Further evaluation would be required to determine the mitigation opportunities for the Calaveras Reservoir expansion concept. The energy requirement for the RDP could be reduced with implementation of energy recovery devices. Participating agencies could enroll in voluntary PG&E Demand Response Programs to reduce demand on the electrical system during peak consumption periods. However, the total amount of energy consumed and pollutants emitted would still be considered an increase.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

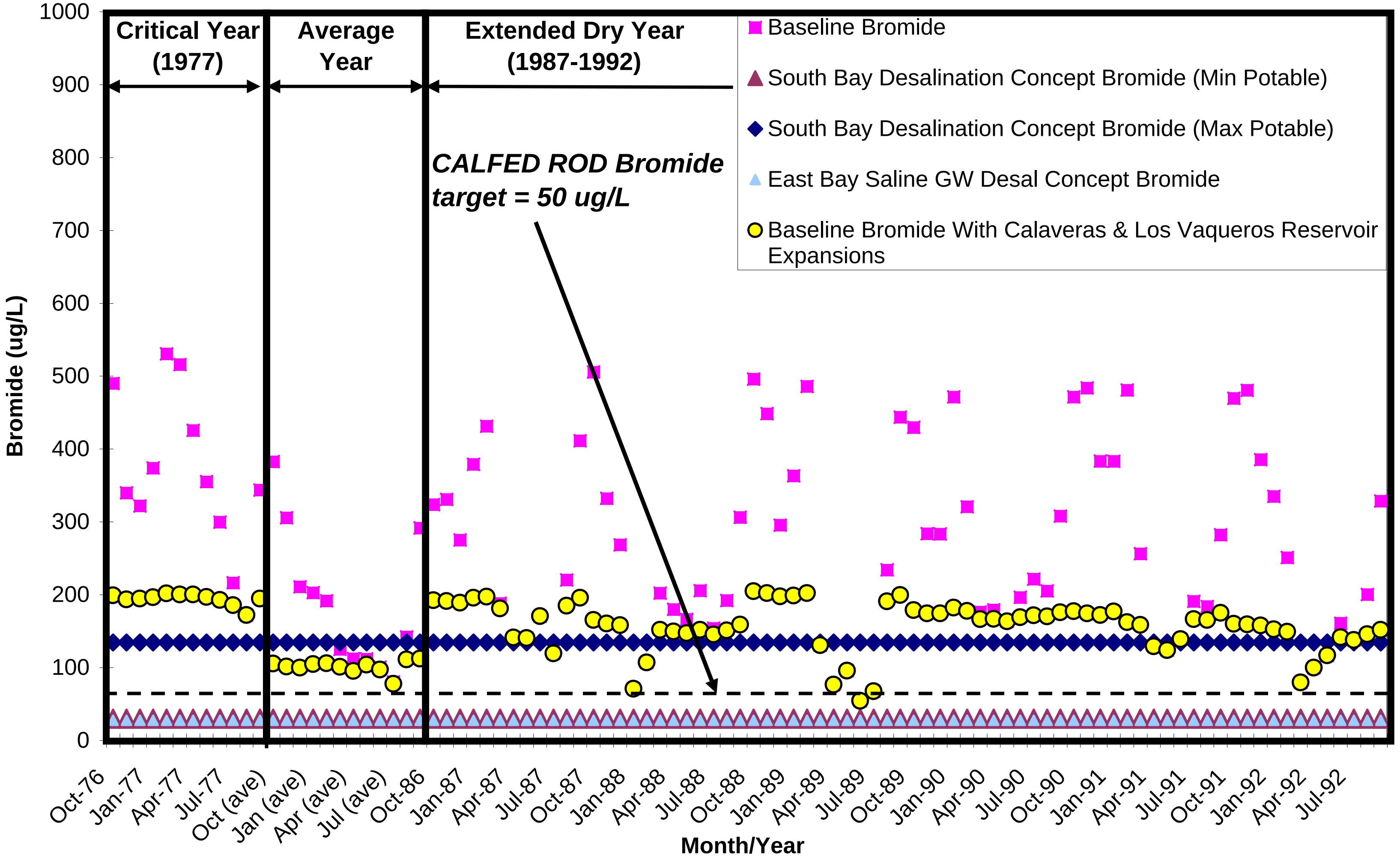


Note: East Bay Desal Bromide reflects bromide in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline bromide with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water Bromide with Concept Bromide

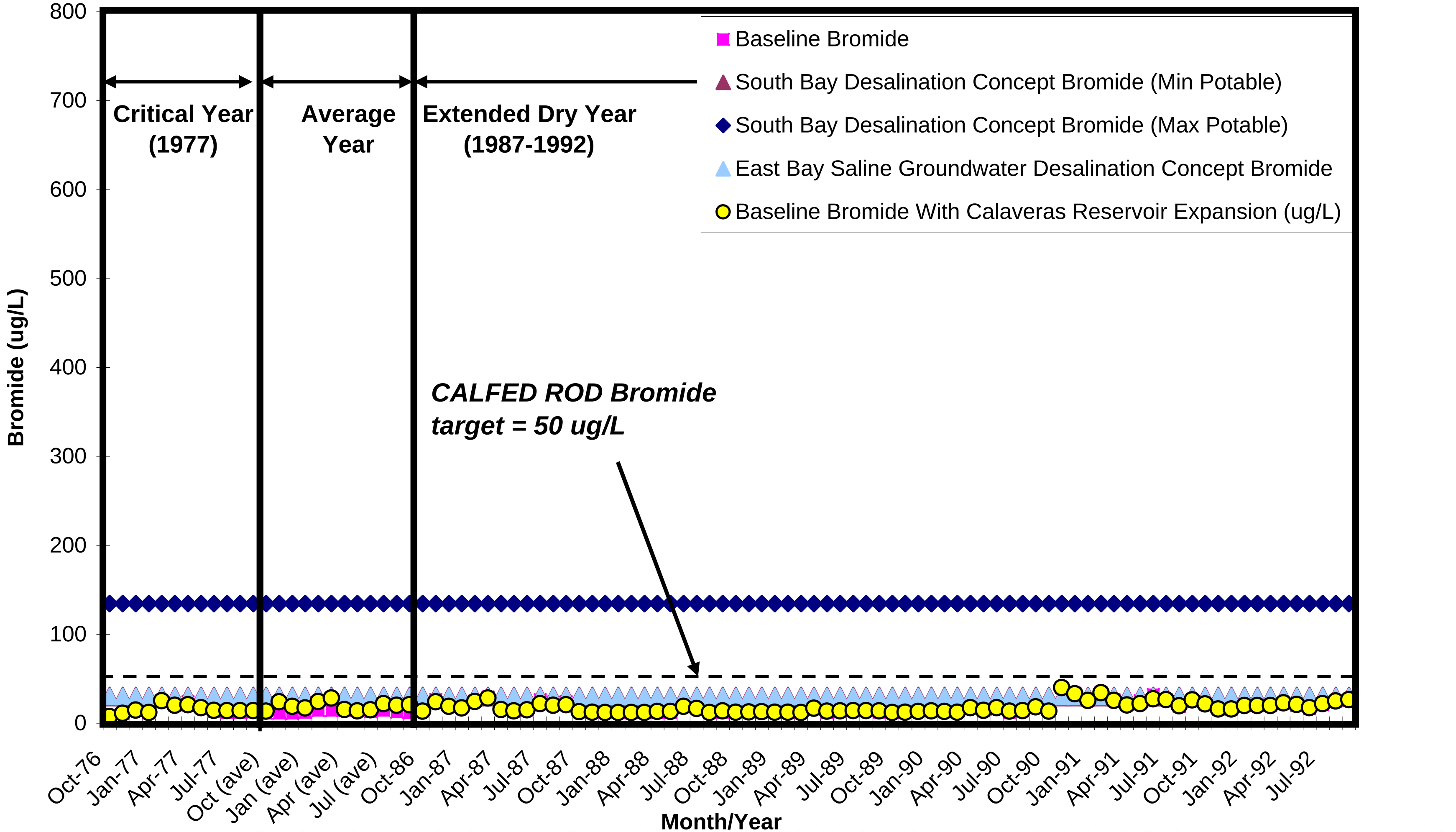


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline bromide with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water Bromide with Concept Bromide

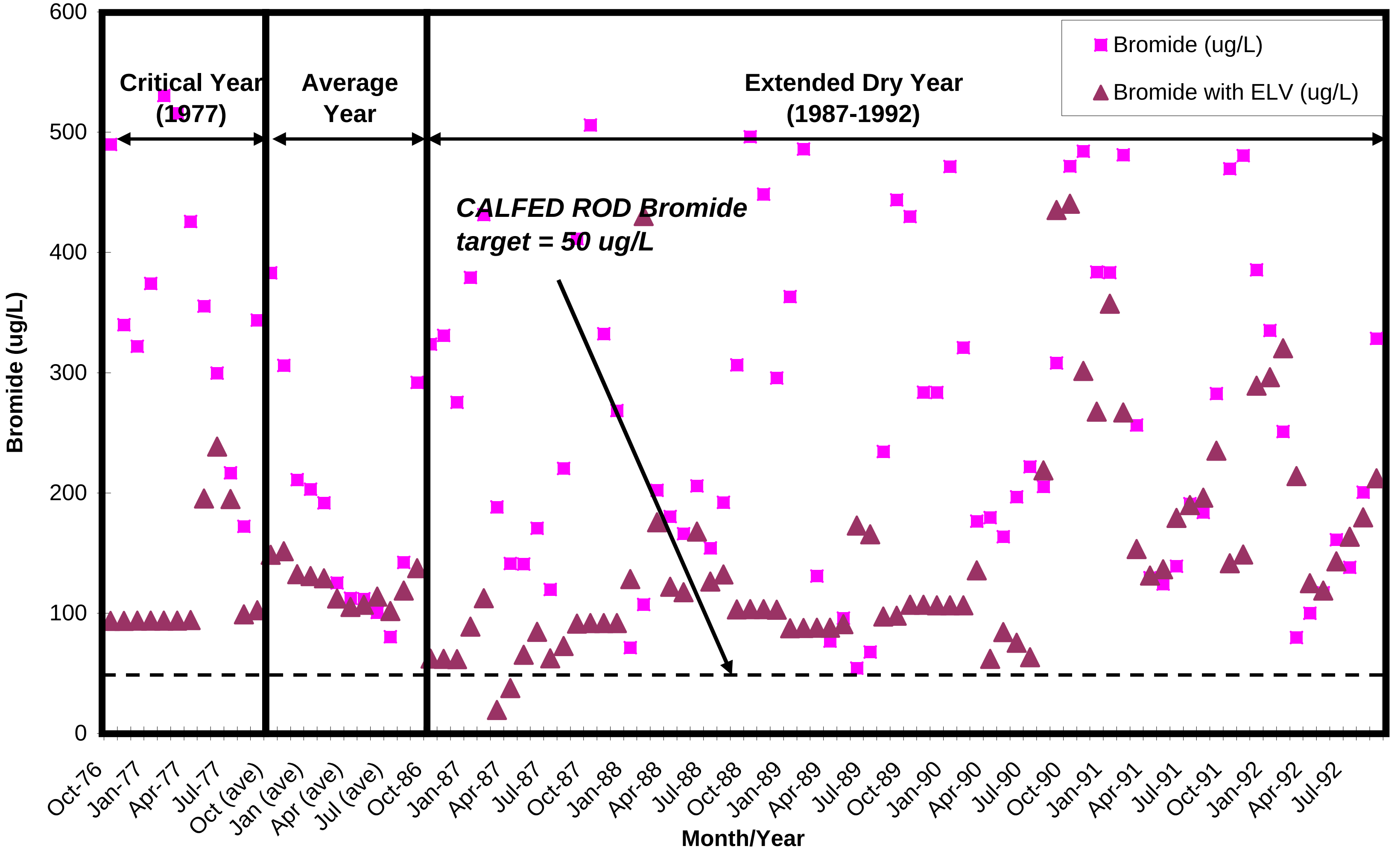


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline bromide with Calaveras is the projected source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline Bromide with Concept Bromide

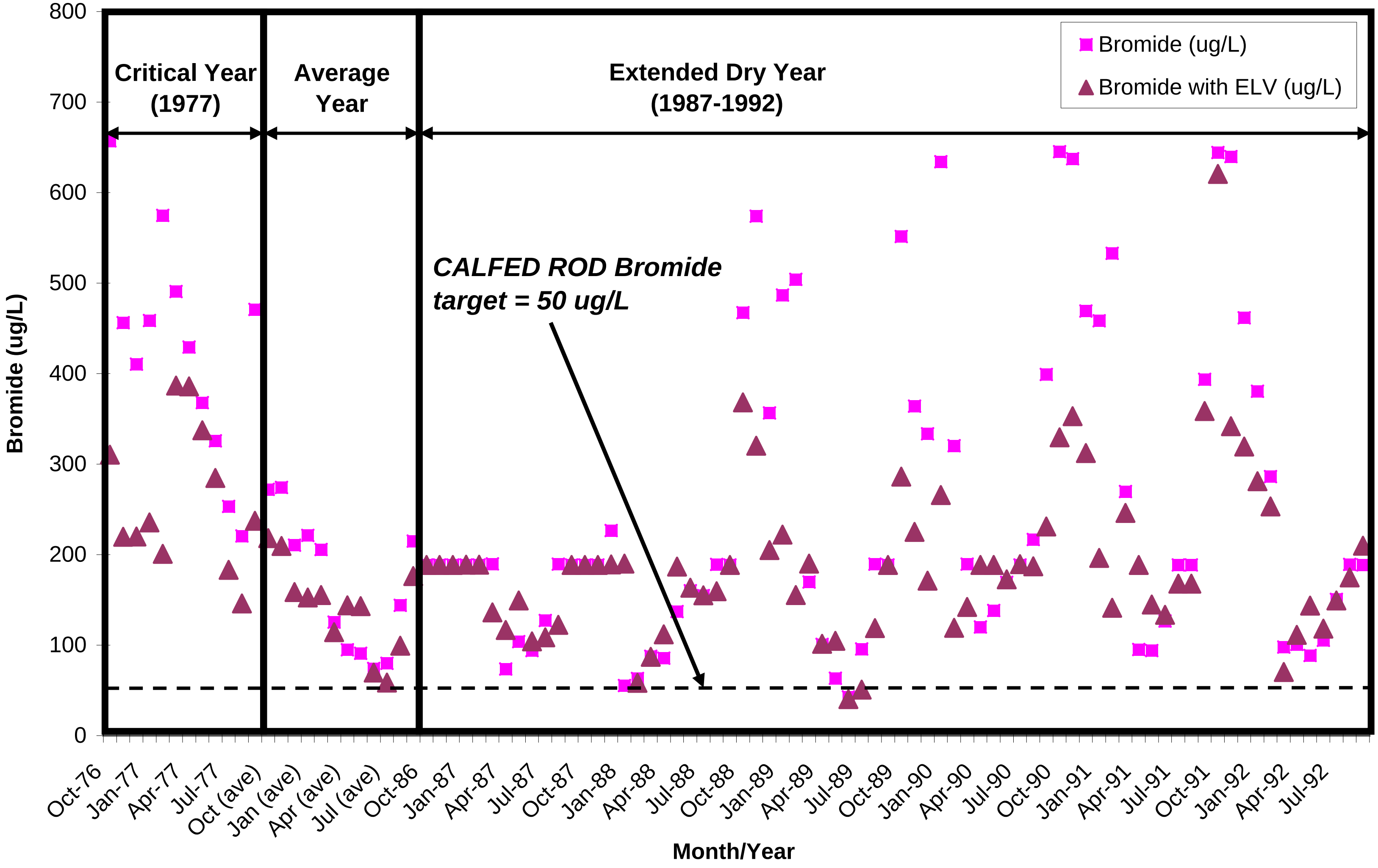


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline Bromide with Concept Bromide

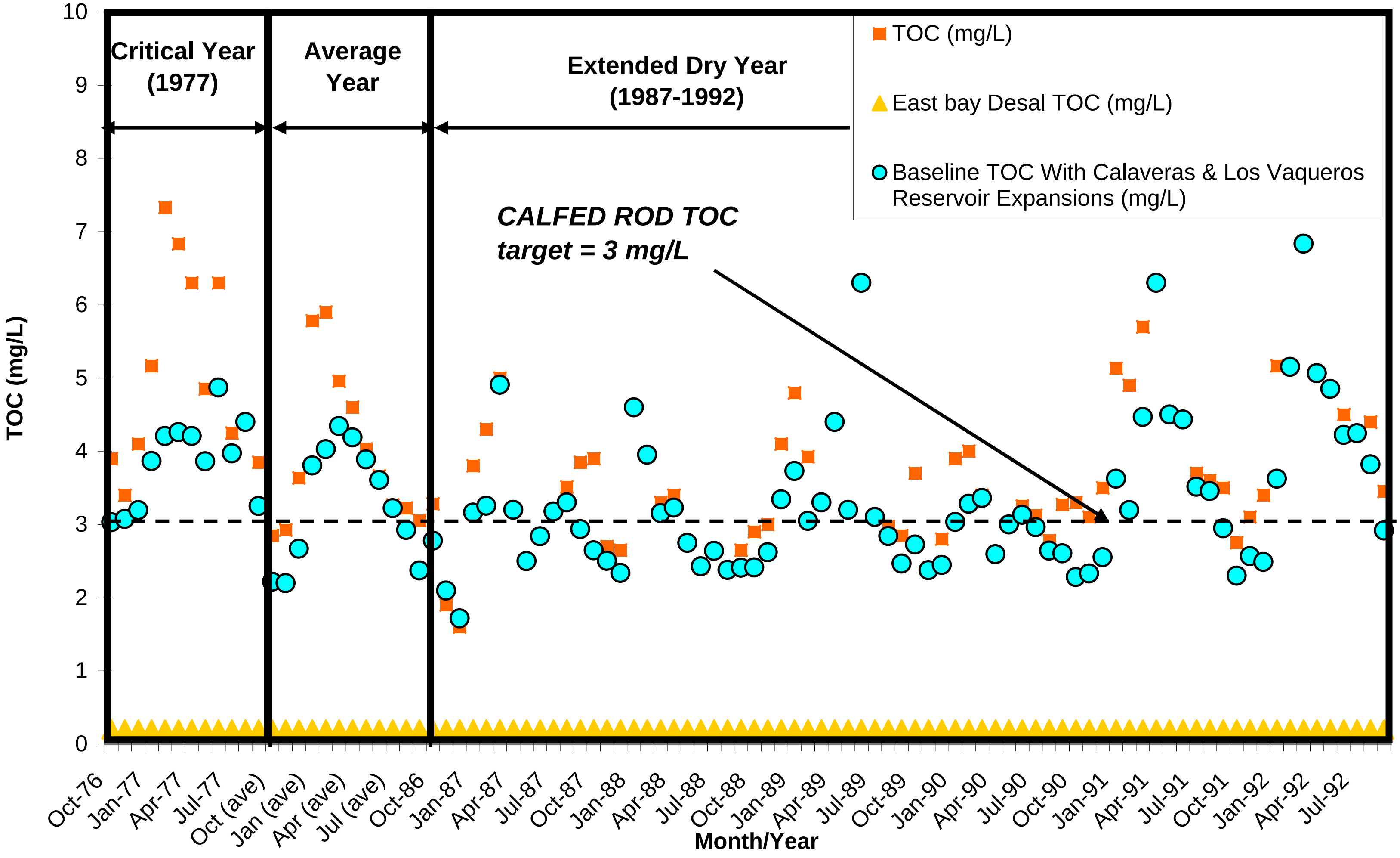


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TOC with Concept TOC

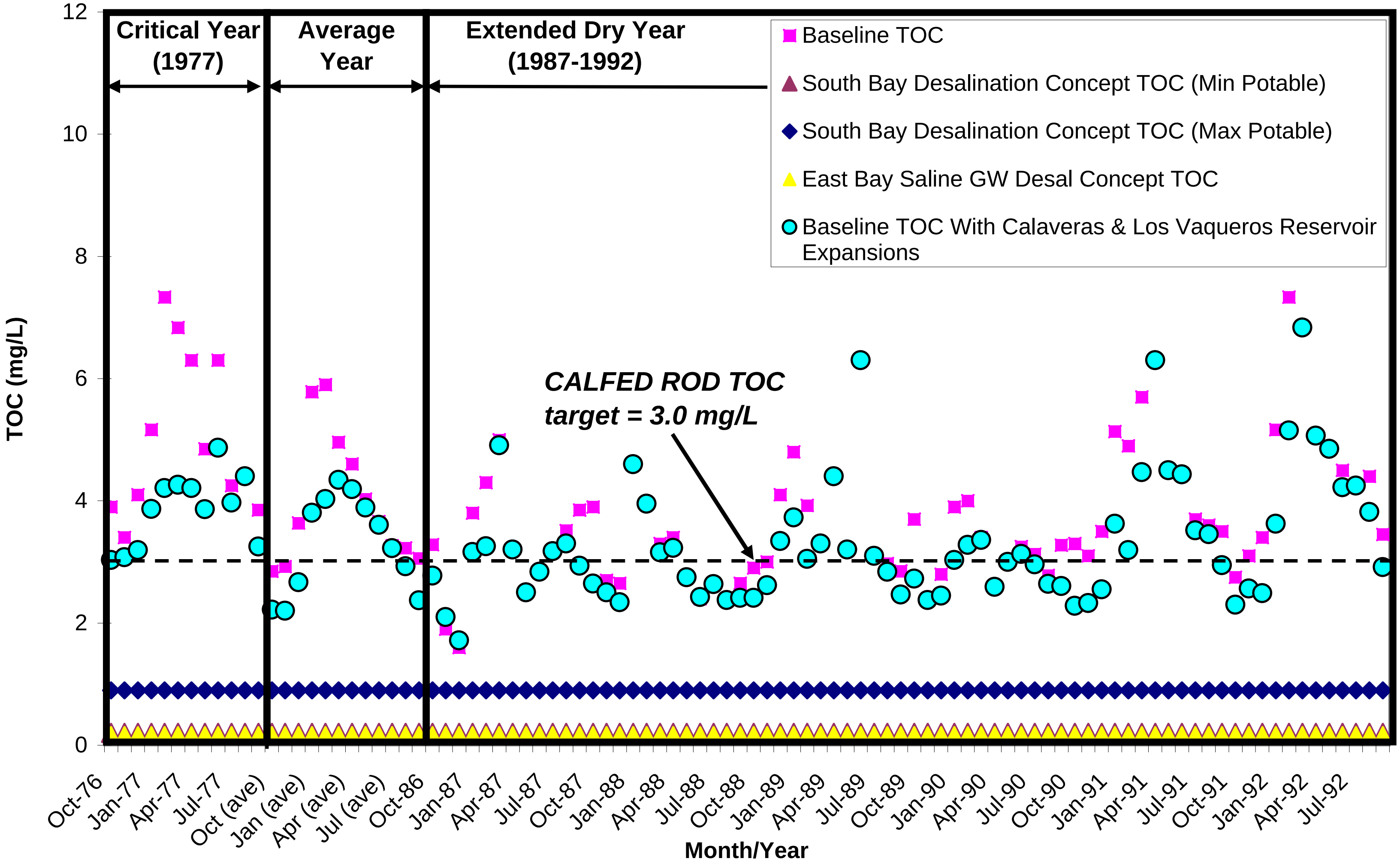


Note: East Bay Desal TOC reflects TOC in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline TOC with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TOC with Concept TOC

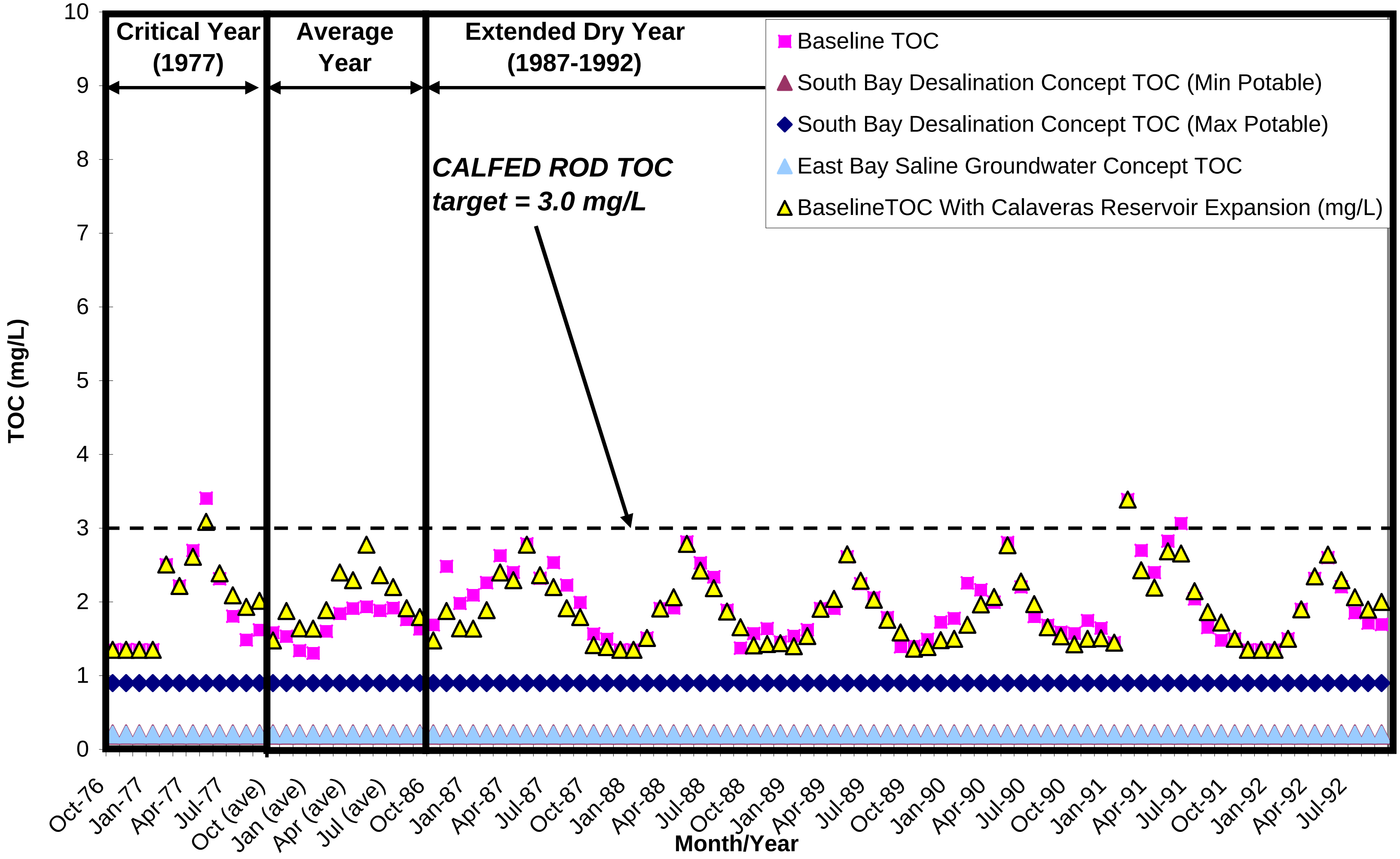


Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TOC with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TOC with Concept TOC

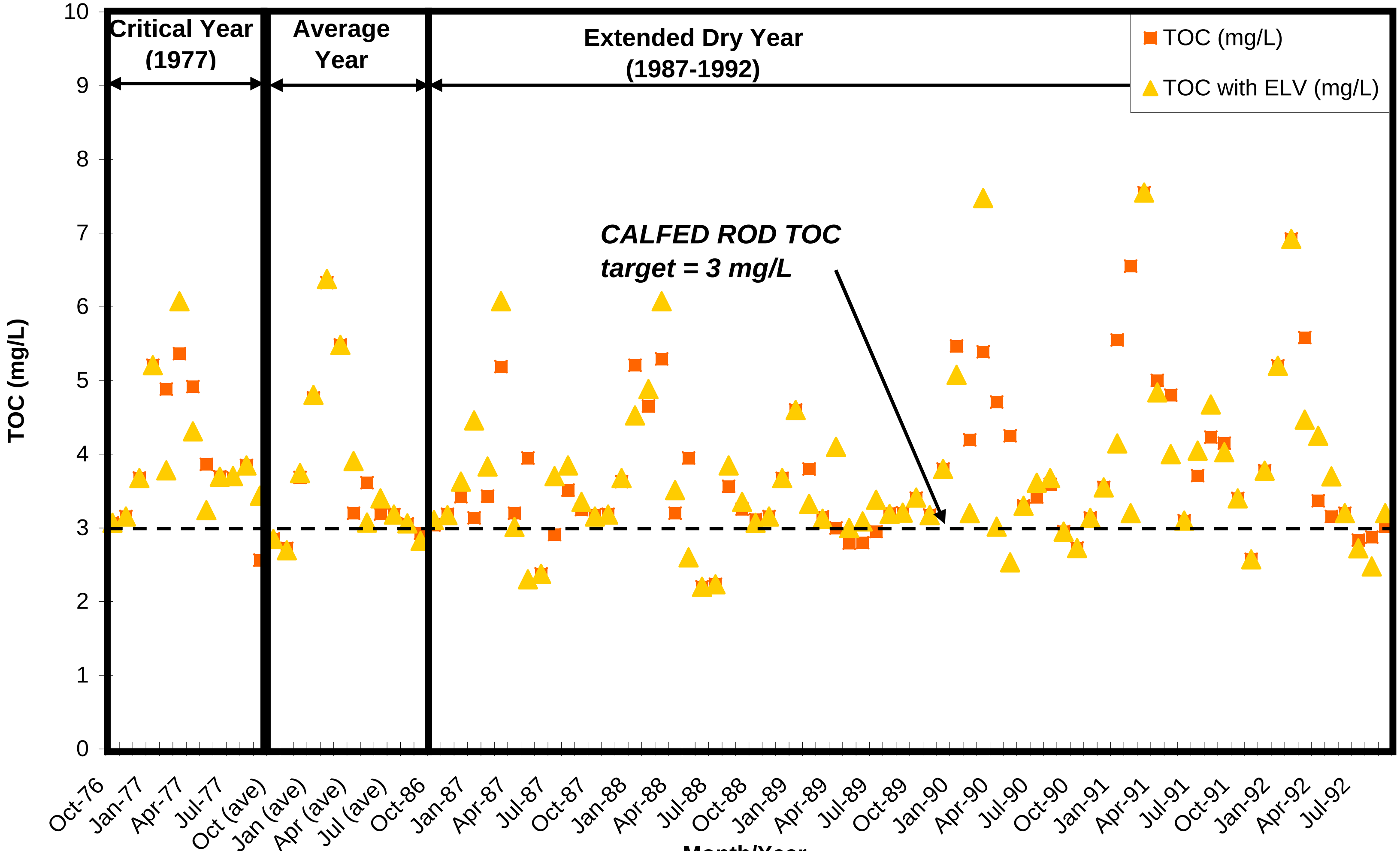


Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline TOC with Calaveras is the projected source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline TOC with Concept TOC

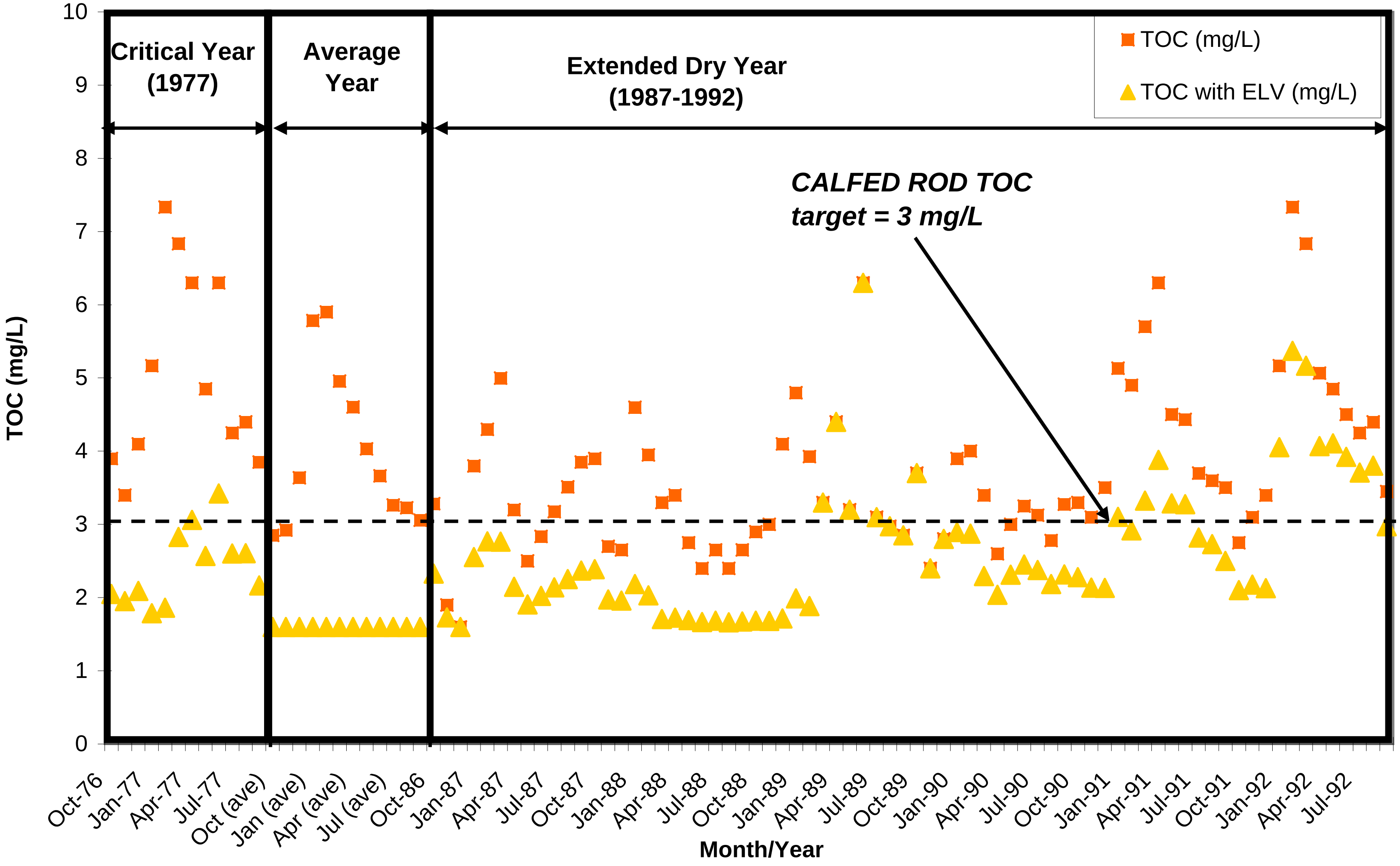


Note: ELV water quality is the flow-weighted mixture of Rock Slough, Old River and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline TOC with Concept TOC

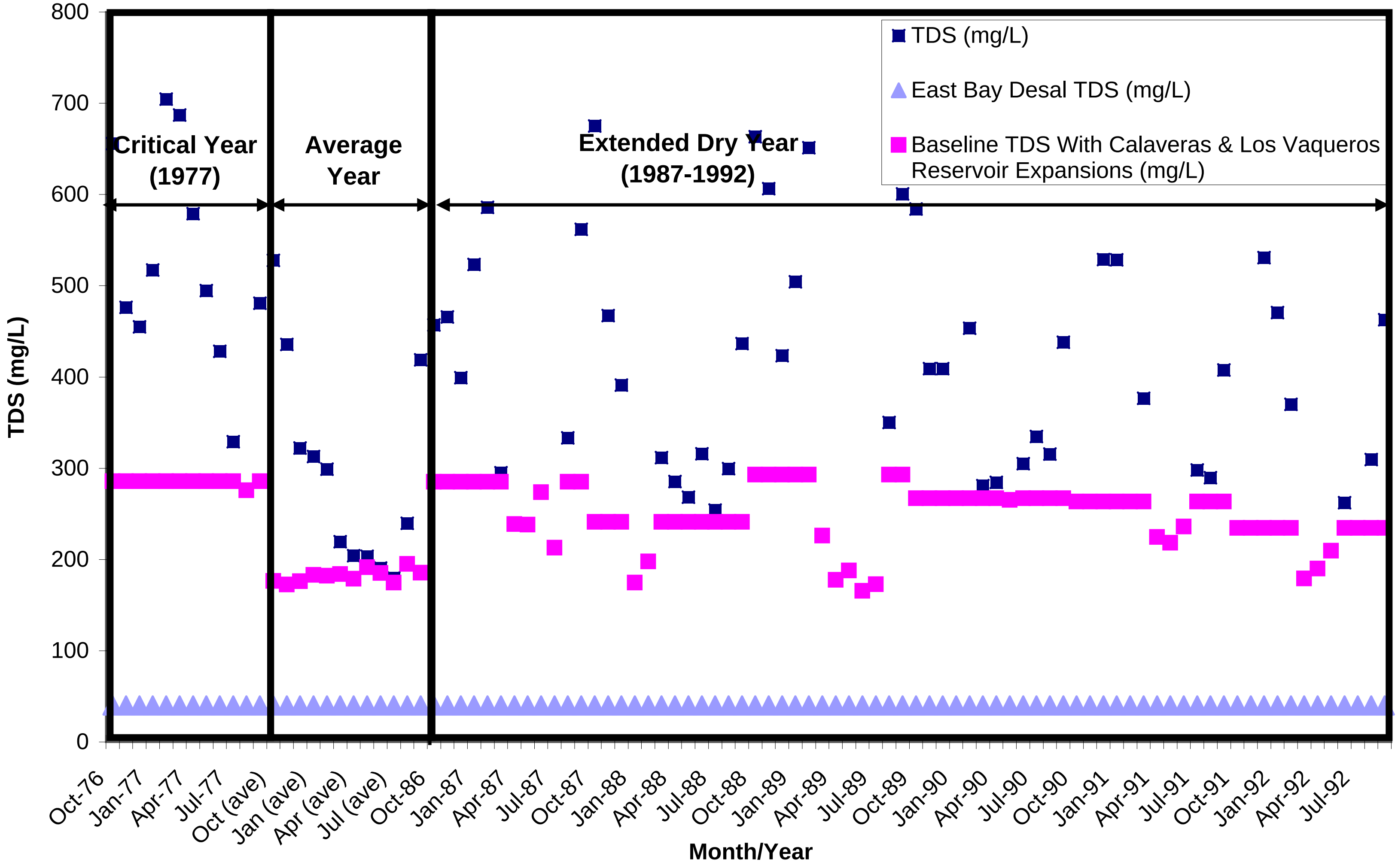


Note: ELV water quality is the flow-weighted mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TDS with Concept TDS

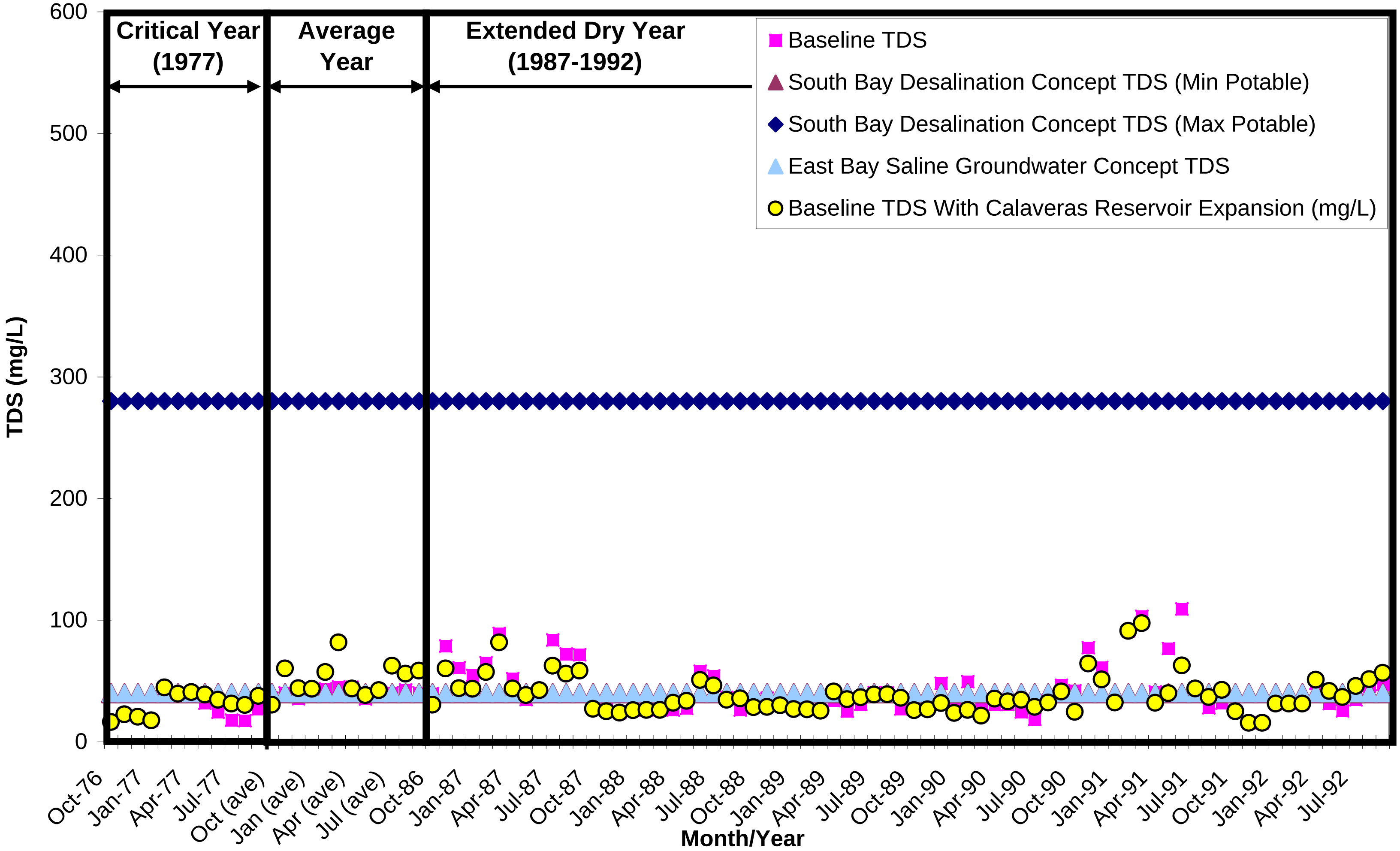


Note: East Bay Desal TDS reflects TDS in pure desalinated supply. This would be blended with ACWD supplies in the distribution system. The baseline TDS with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TDS with Concept TDS

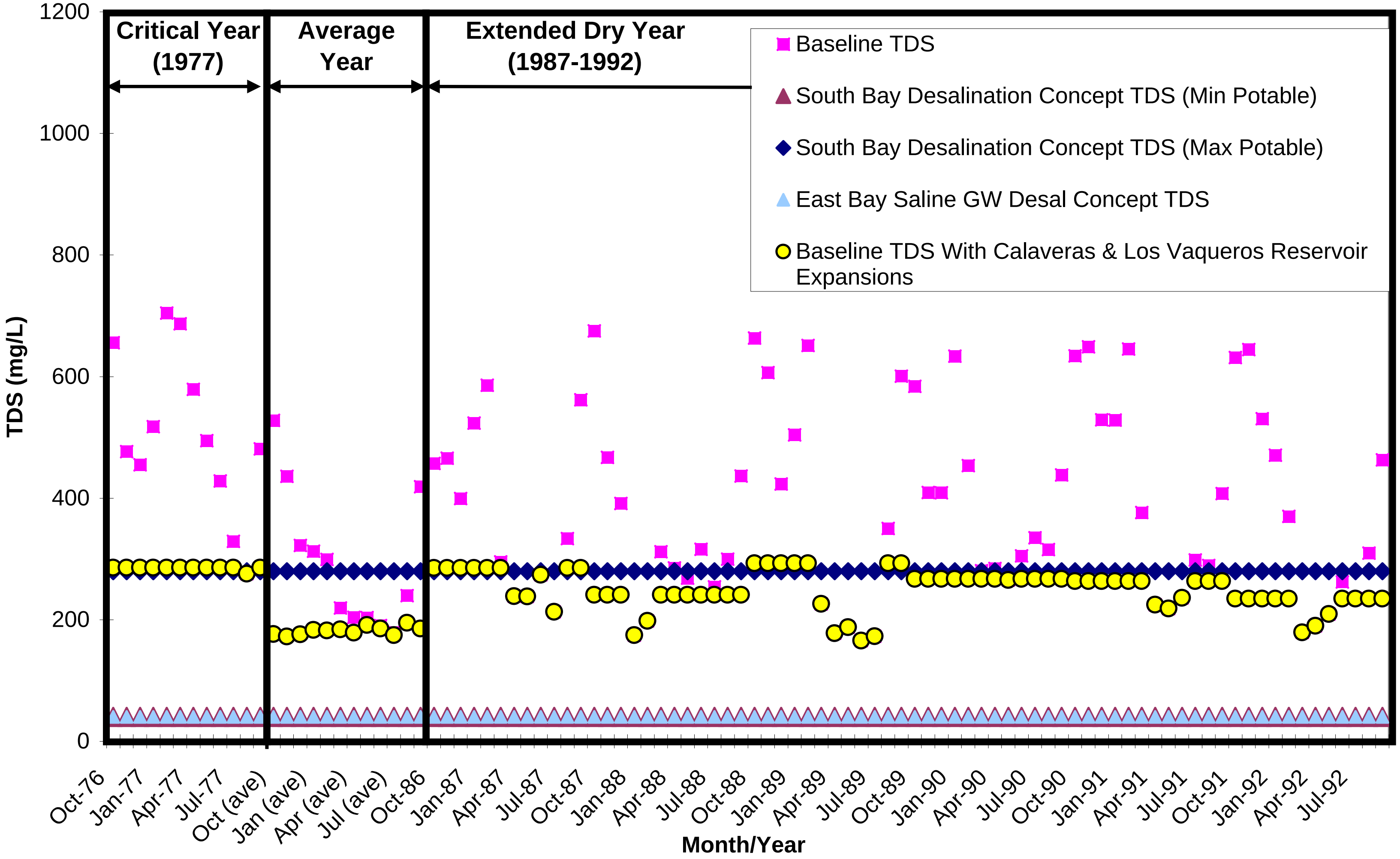


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline TDS with Calaveras is the projected source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TDS with Concept TDS

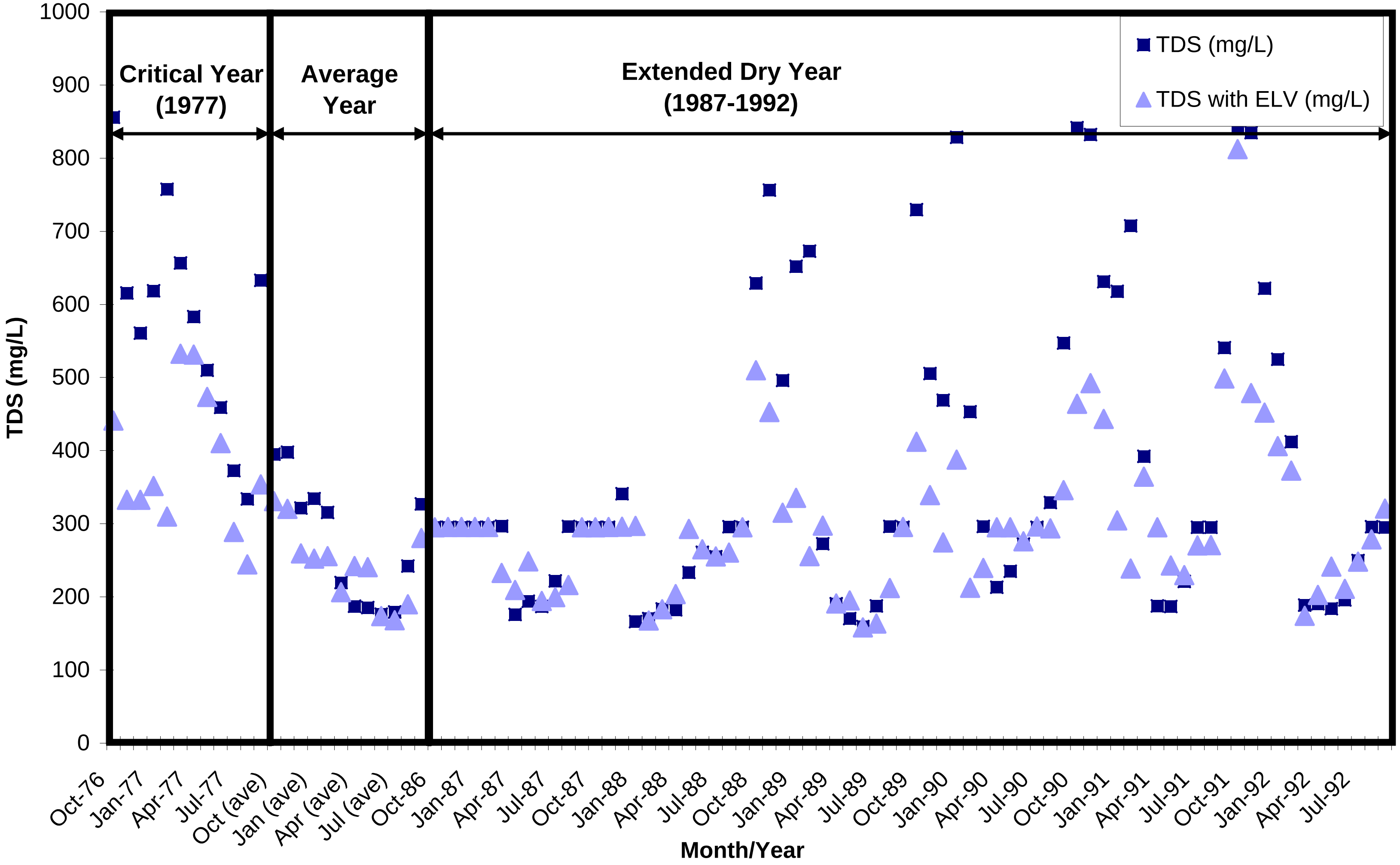


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TDS with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline TDS with Concept TDS

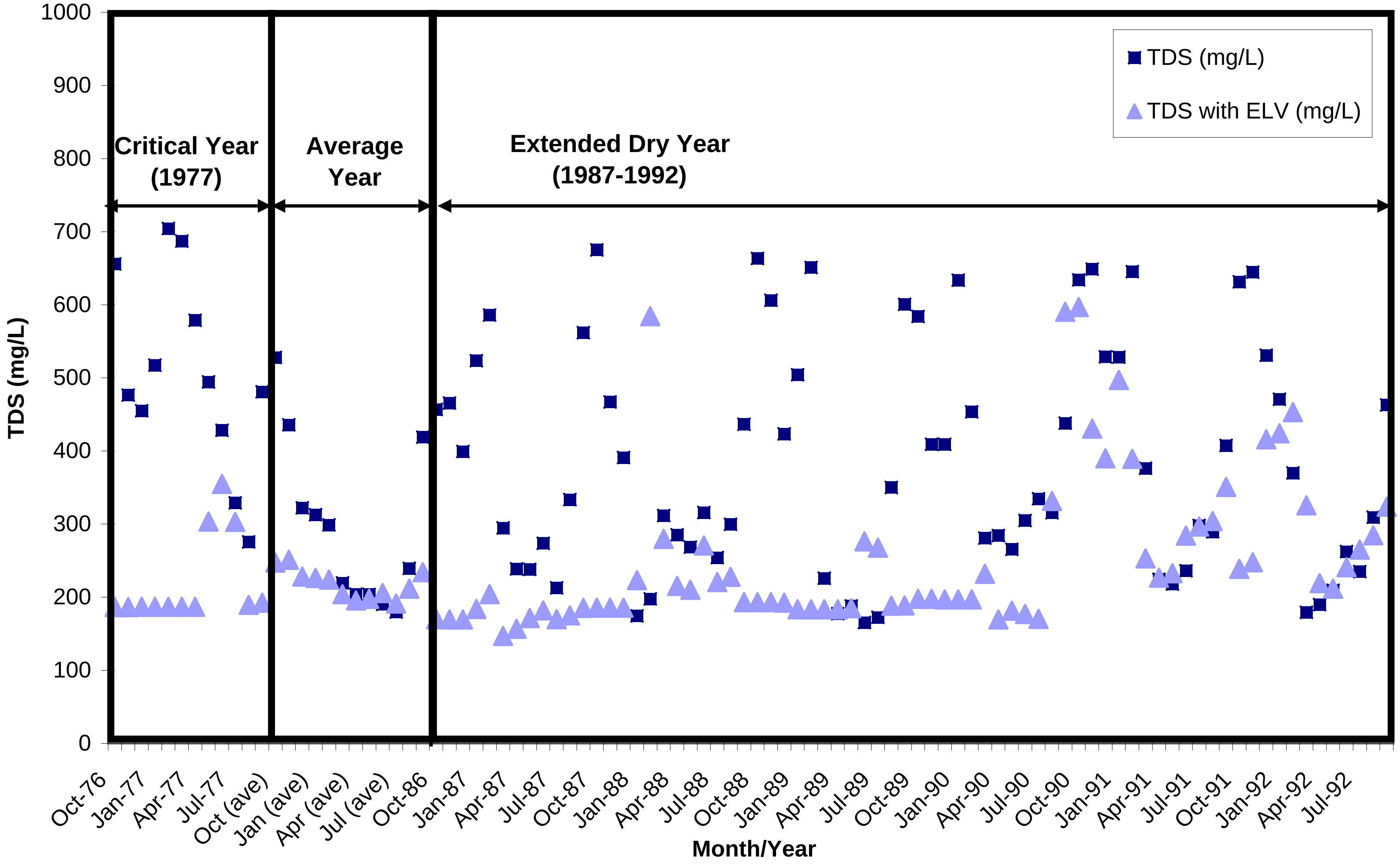


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline TDS with Concept TDS

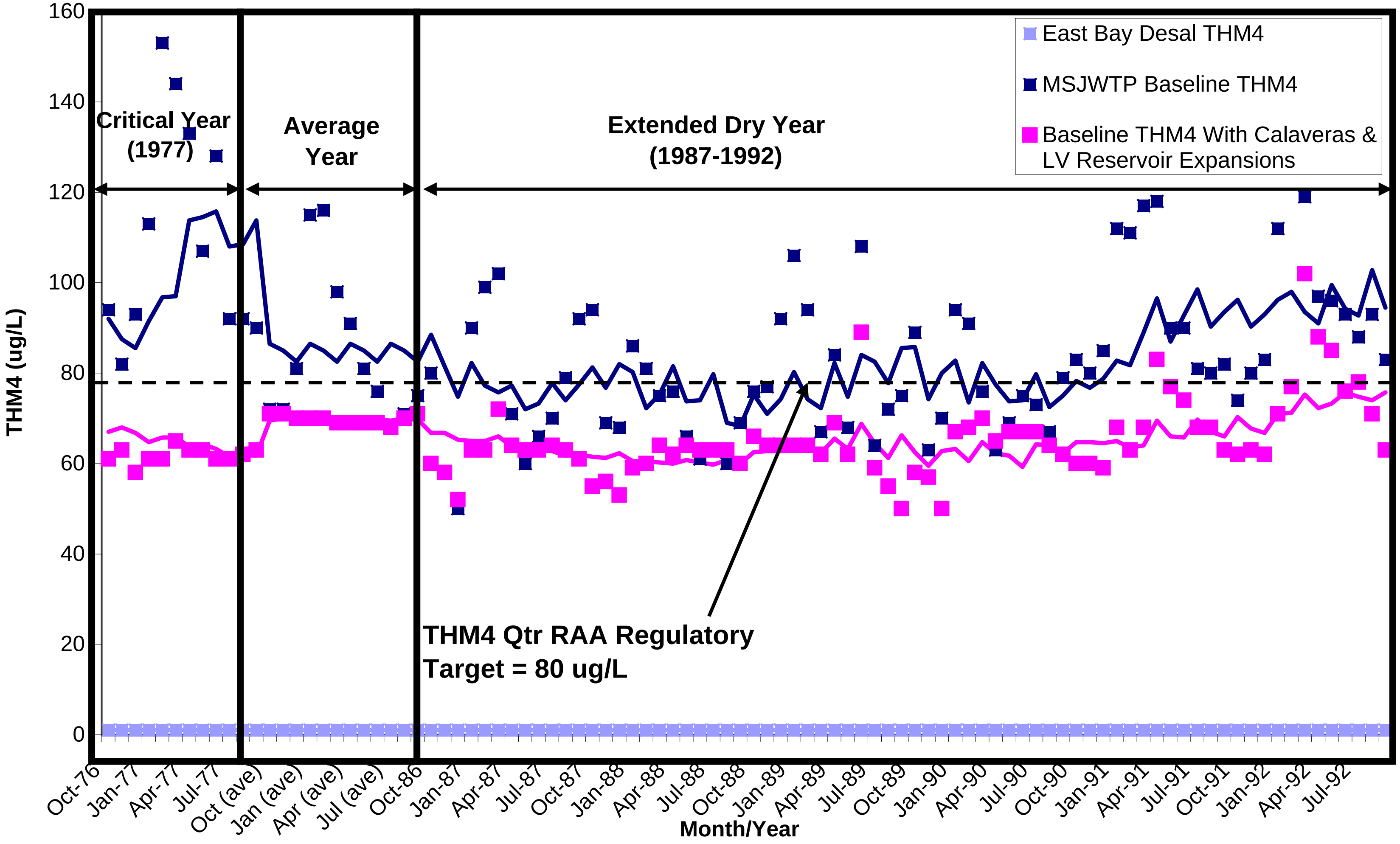


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (MSJWTP)

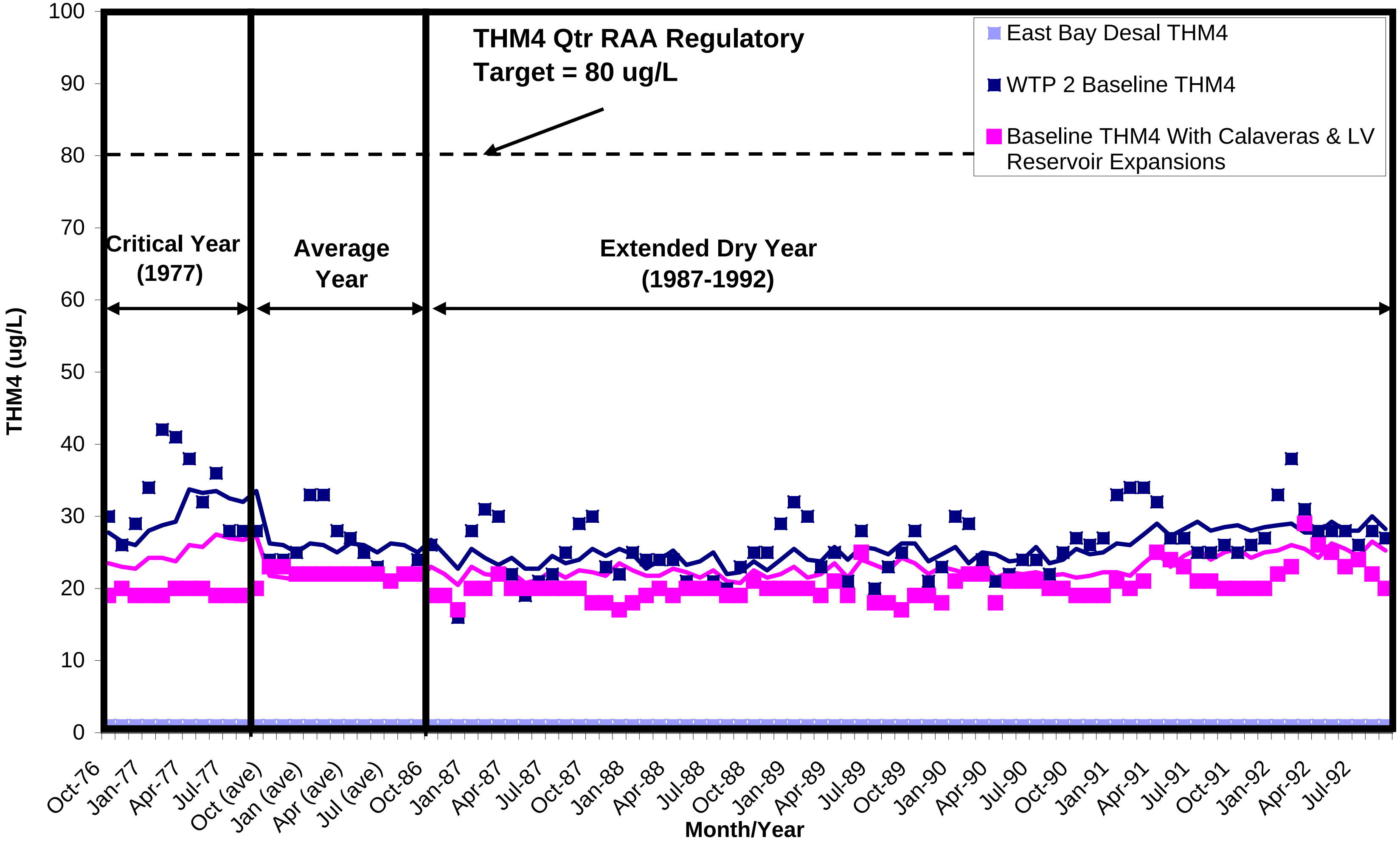


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline THM4 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for MSJWTP.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (WTP 2)

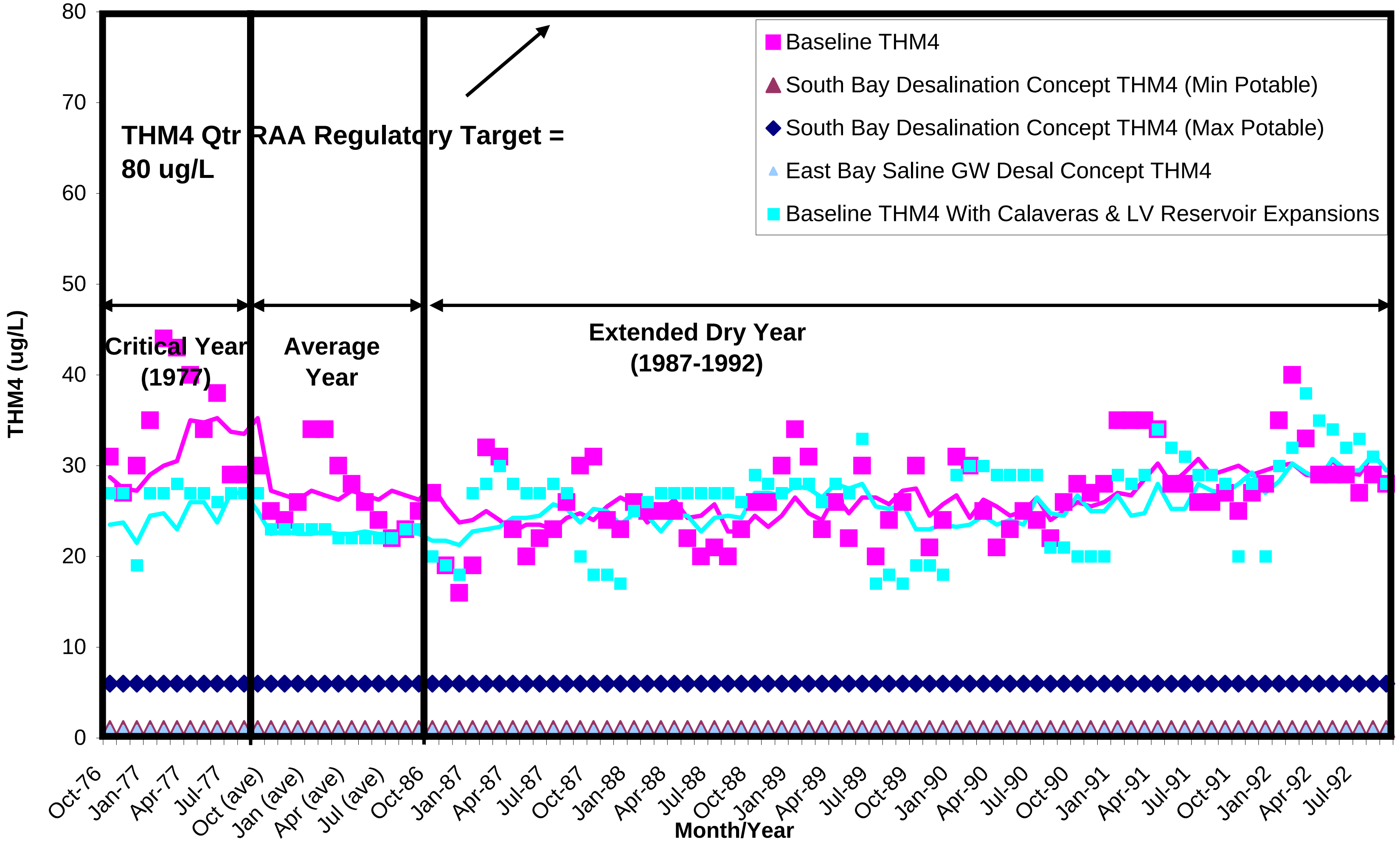


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline THM4 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline THM4 with Concept THM4

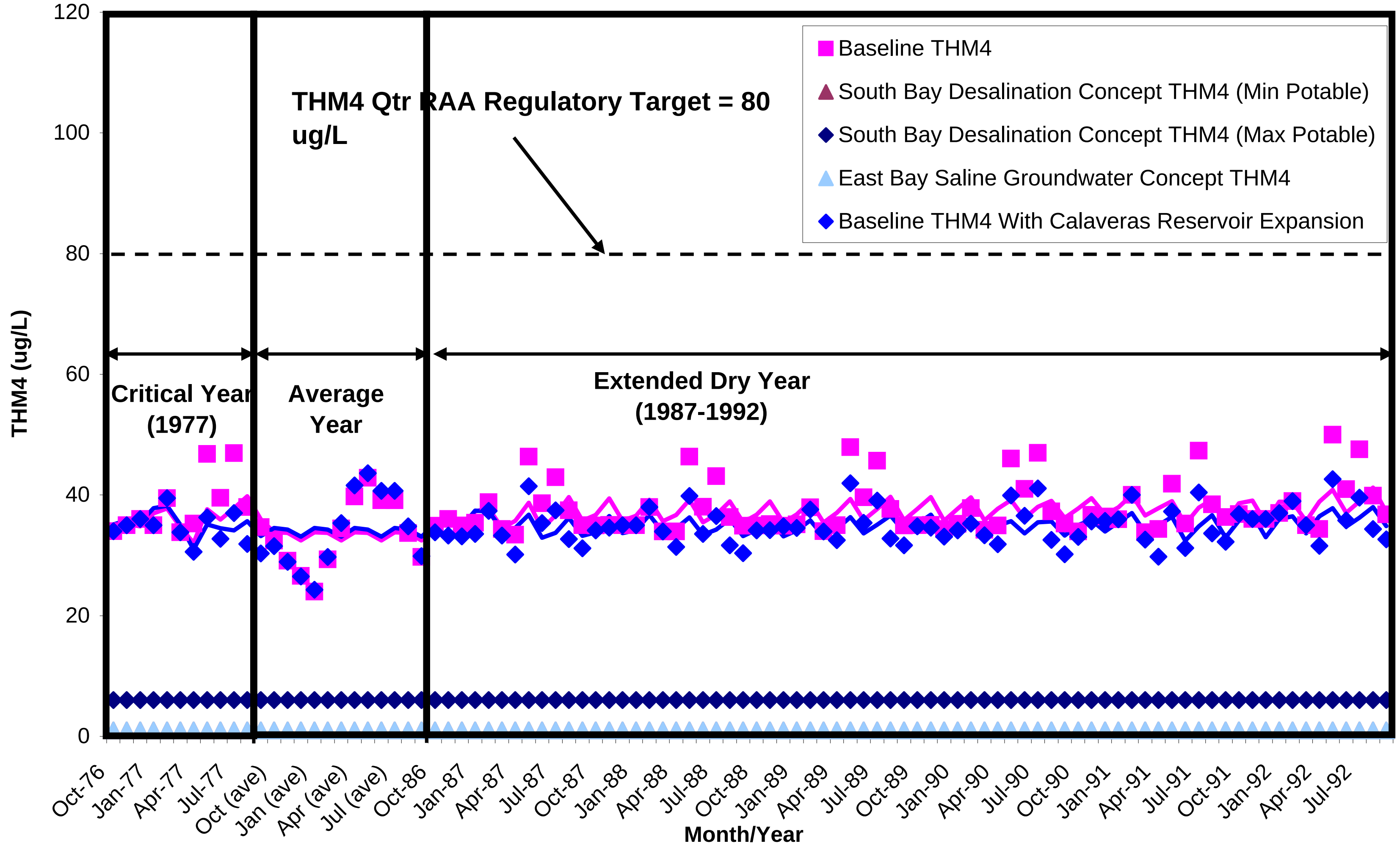


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline THM4 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production assumes settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline THM4 with Concept THM4

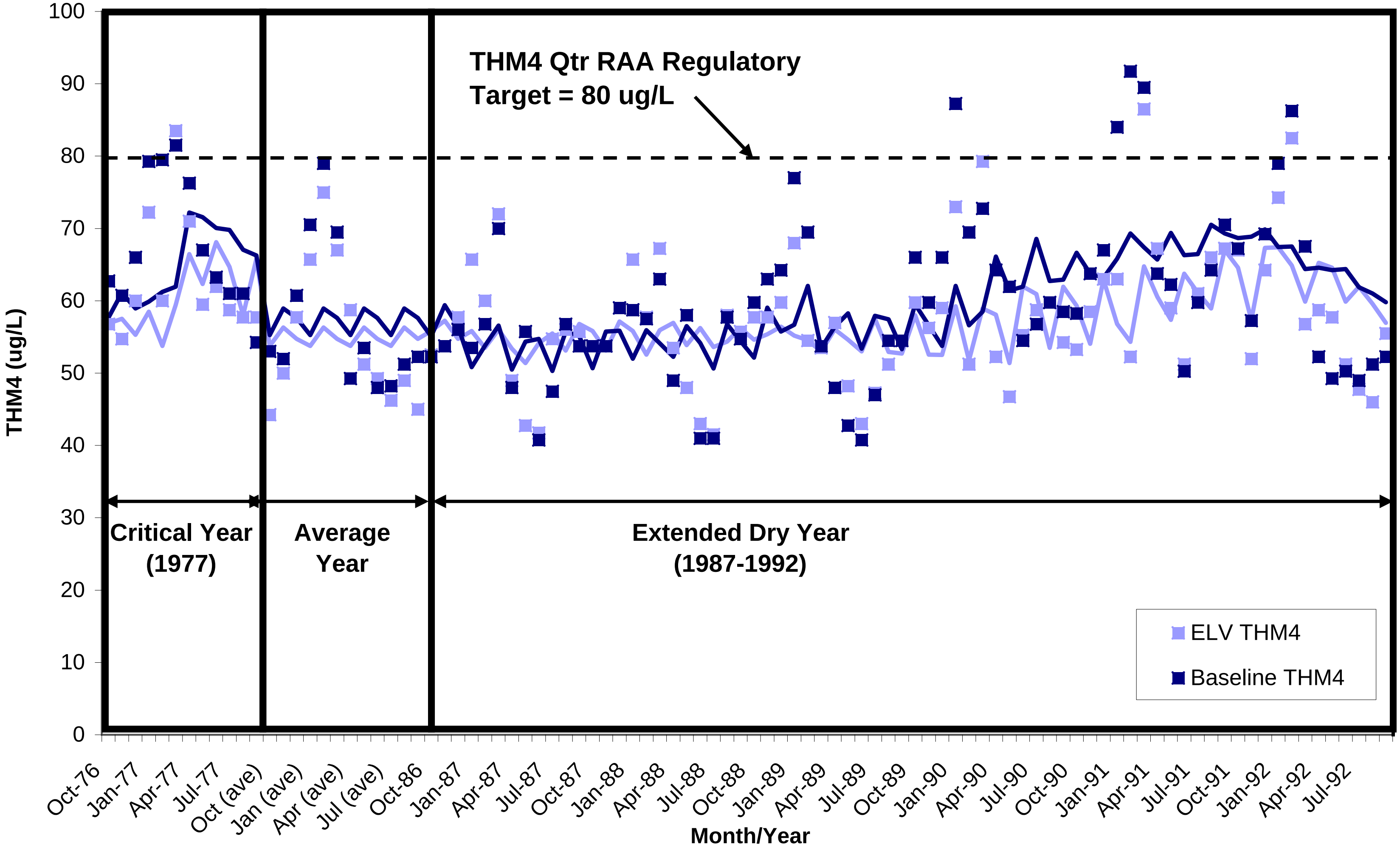


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. The baseline THM4 with Calaveras Reservoir Expansion is the projected blended treated water quality entering the BDPLs with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline THM4 with Concept THM4

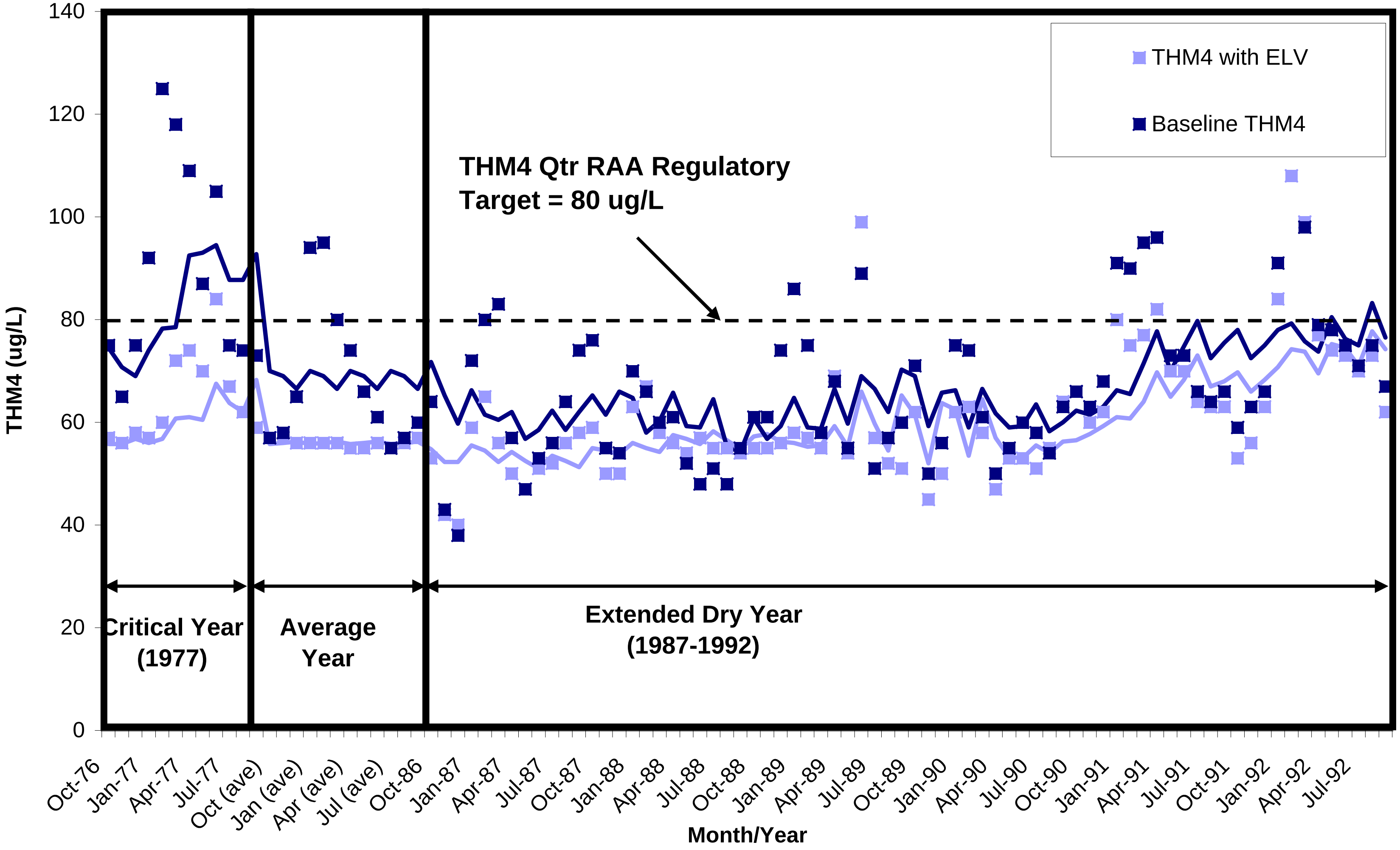


Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline THM4 with Concept THM4 (Conventional Treatment)

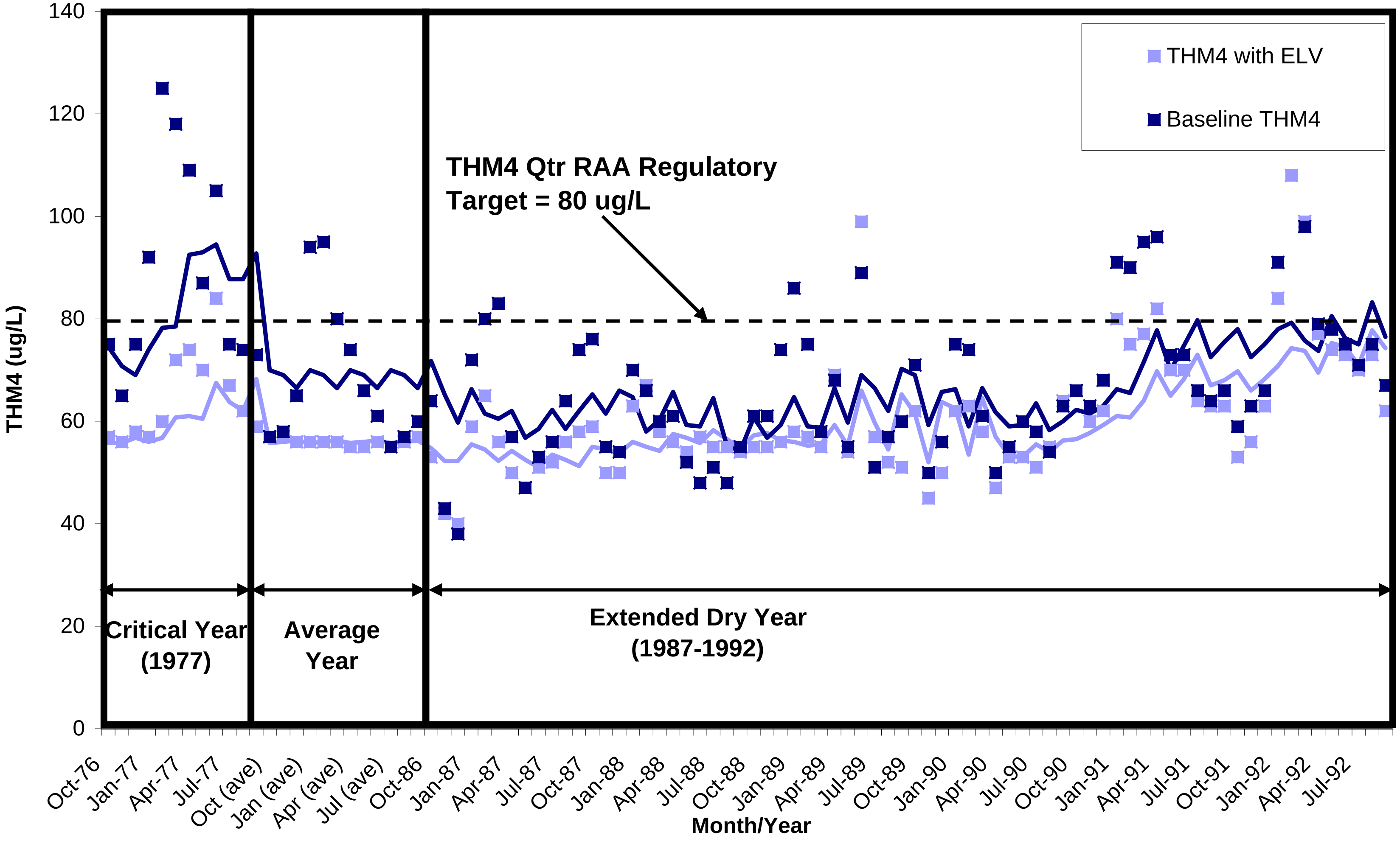


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline THM4 with Concept THM4 (UF & Conventional Treatment)

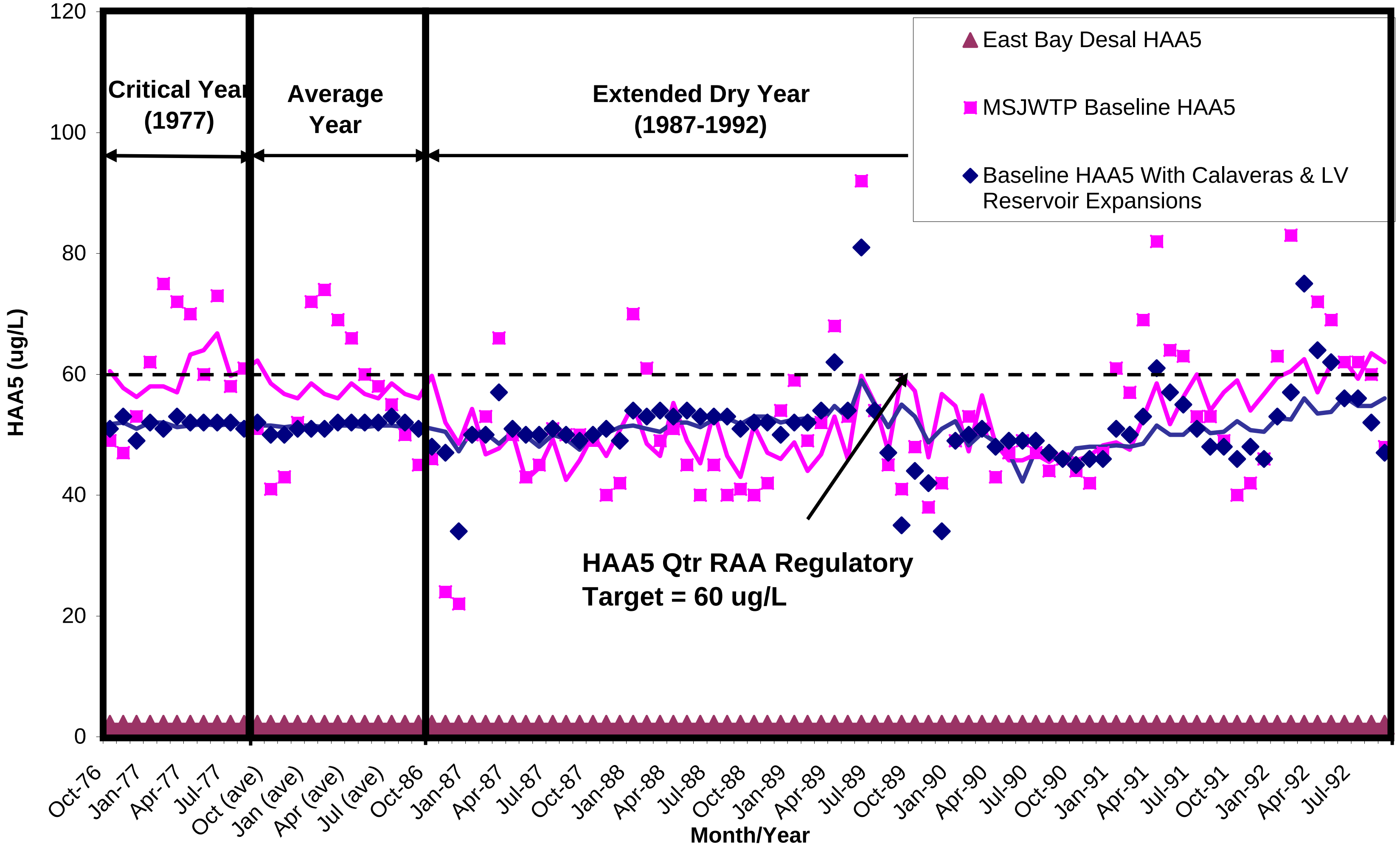


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 8:12 blend of UF:conventionally treated supplies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline HAA5 with Concept HAA5 (MSJWTP)

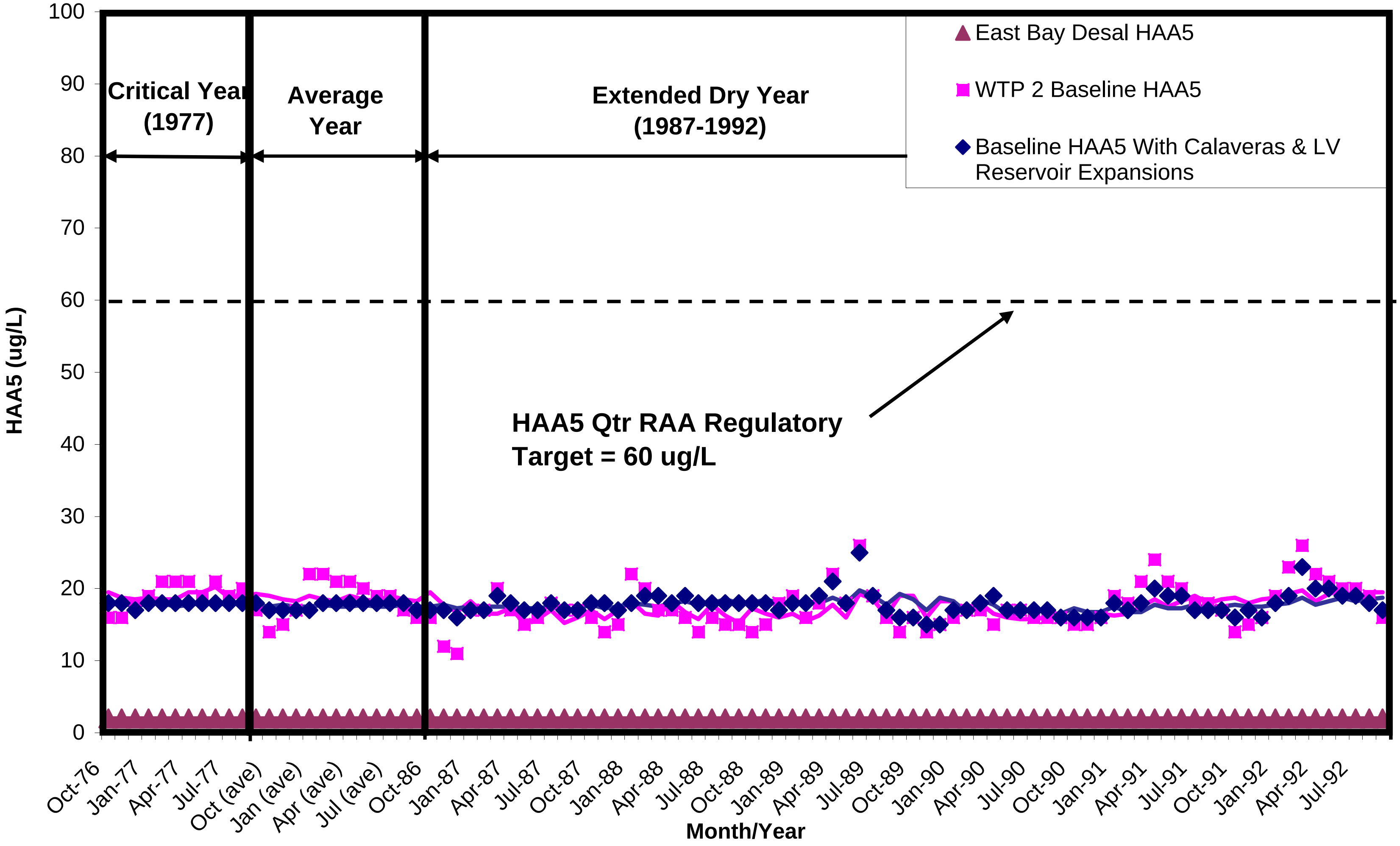


Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline HAA5 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for MSJWTP .

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline HAA5 with Concept HAA5 (WTP 2)

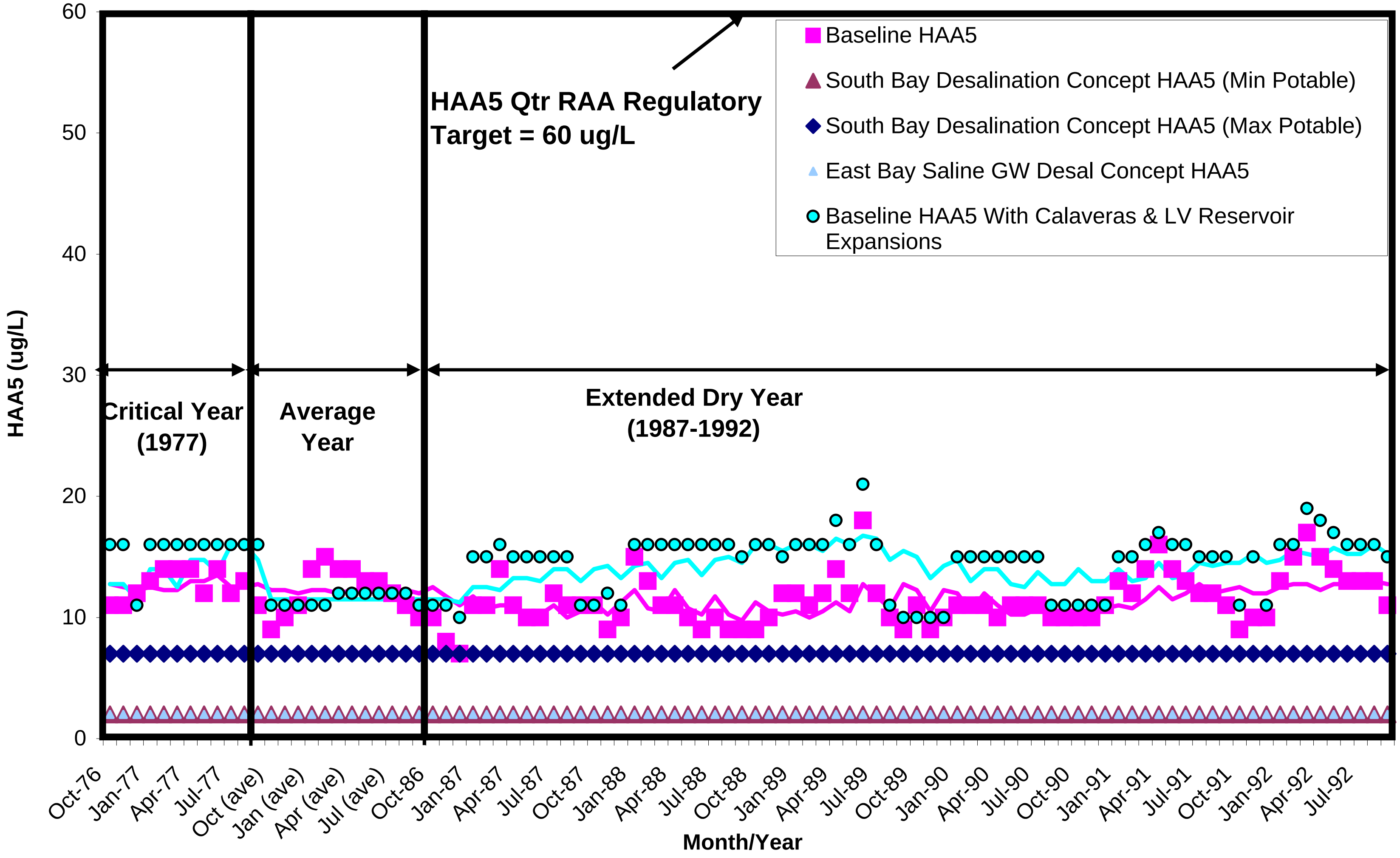


Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline HAA5 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for WTP 2.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline HAA5 with Concept HAA5

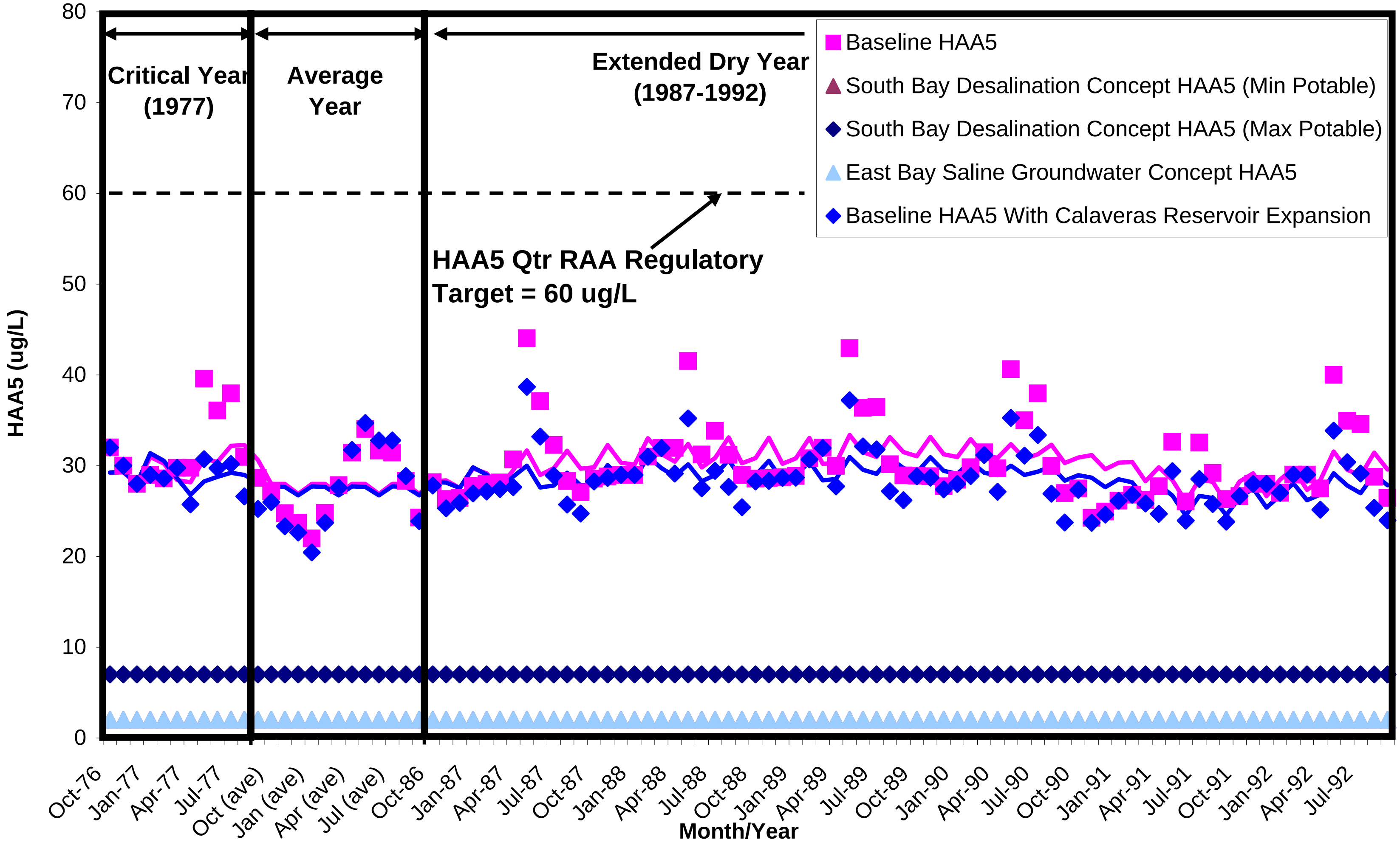


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline HAA5 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production for settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline HAA5 with Concept HAA5

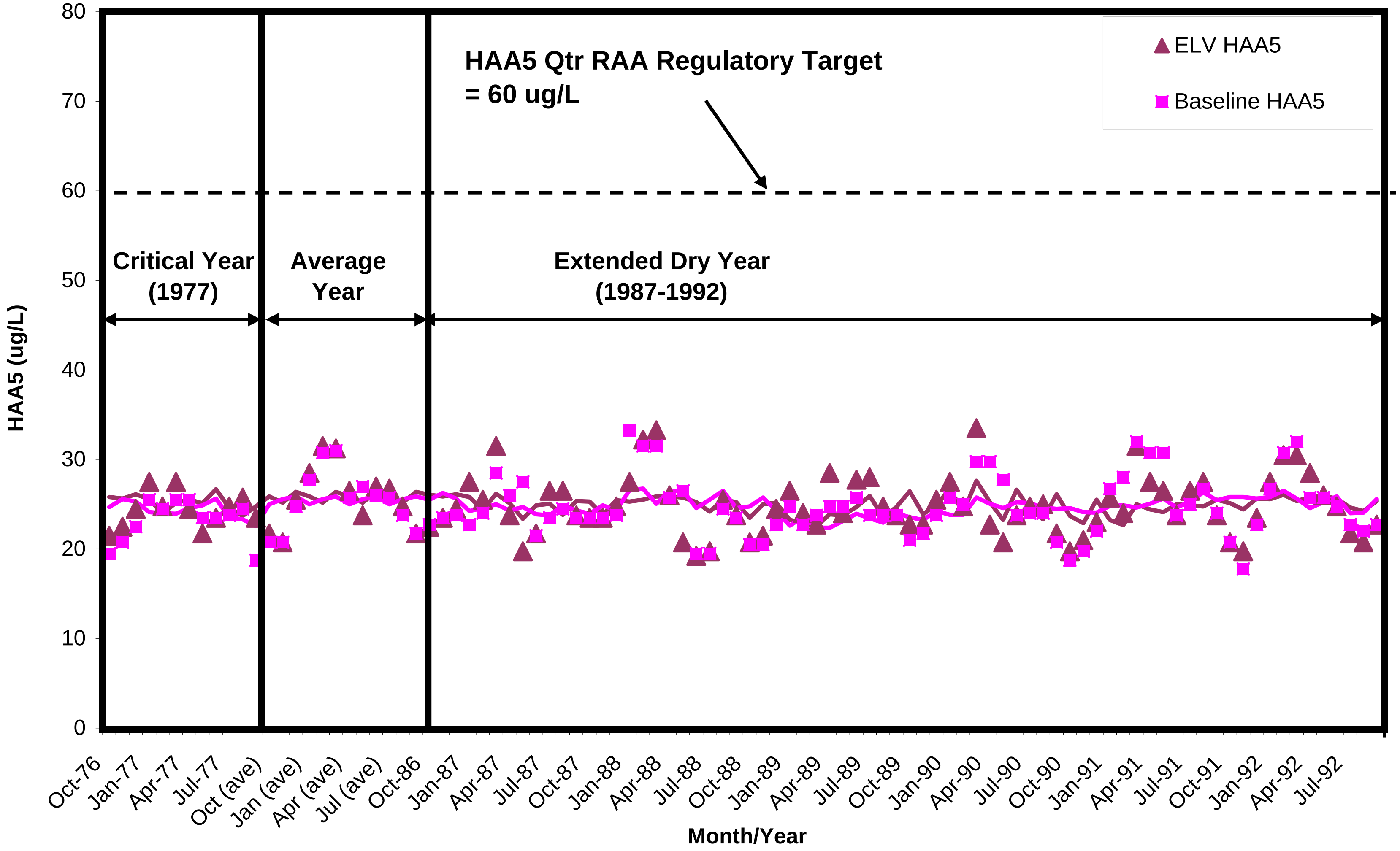


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. The baseline HAA5 with Calaveras Reservoir Expansion is the projected blended treated water quality entering the BDPLs with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

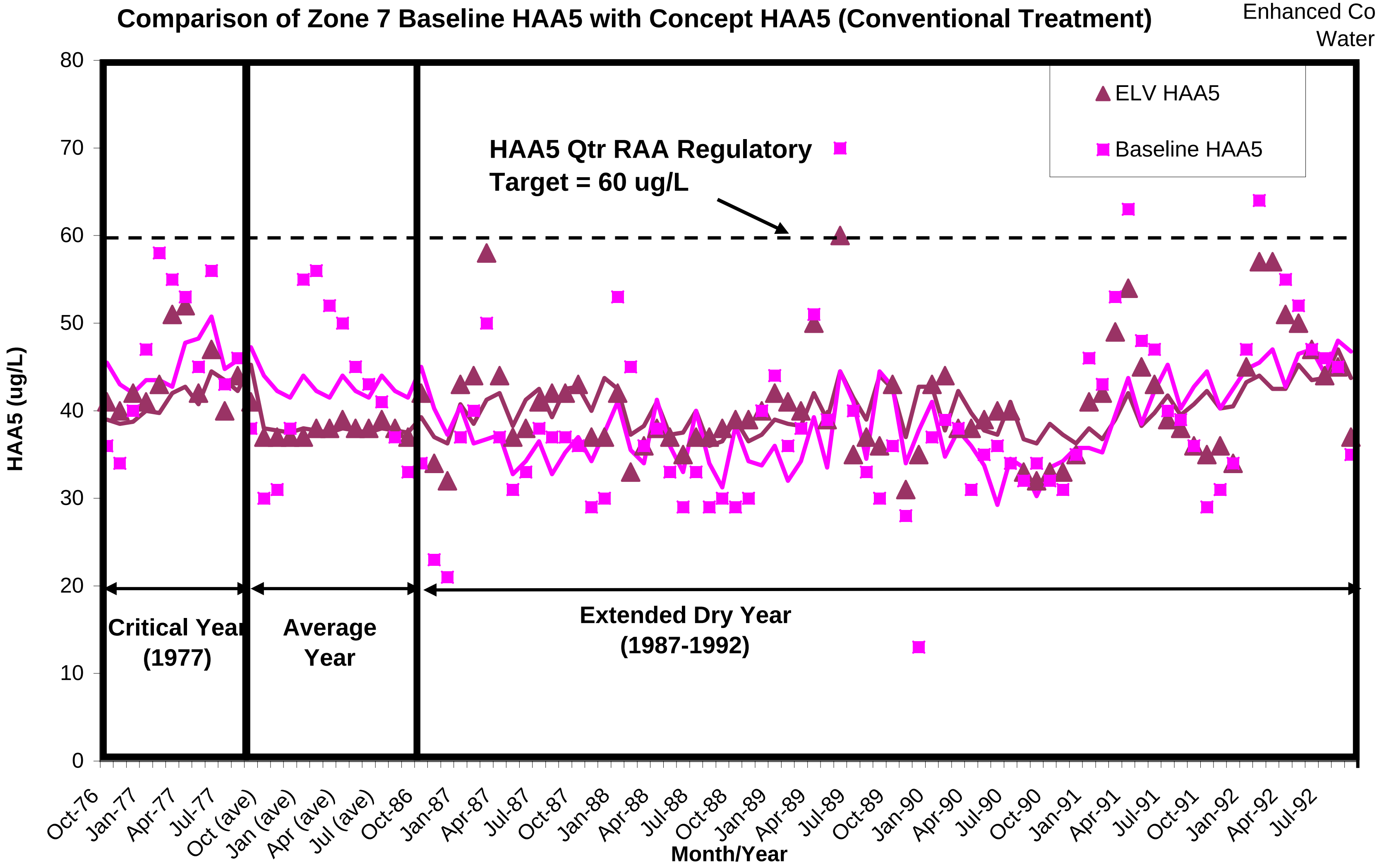
Comparison of CCWD Baseline HAA5 with Concept HAA5



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

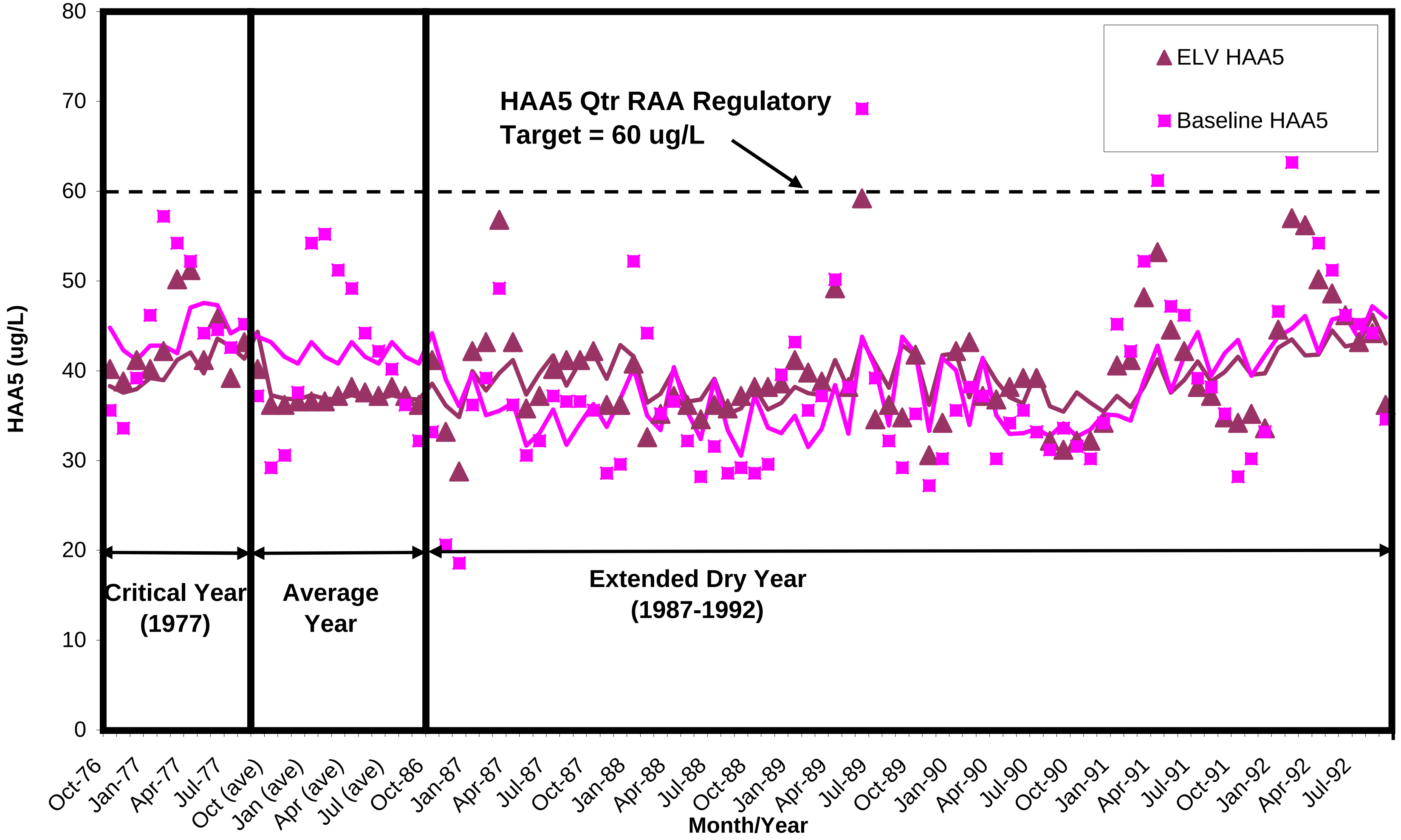


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline HAA5 with Concept HAA5 (UF & Conventional Treatment)

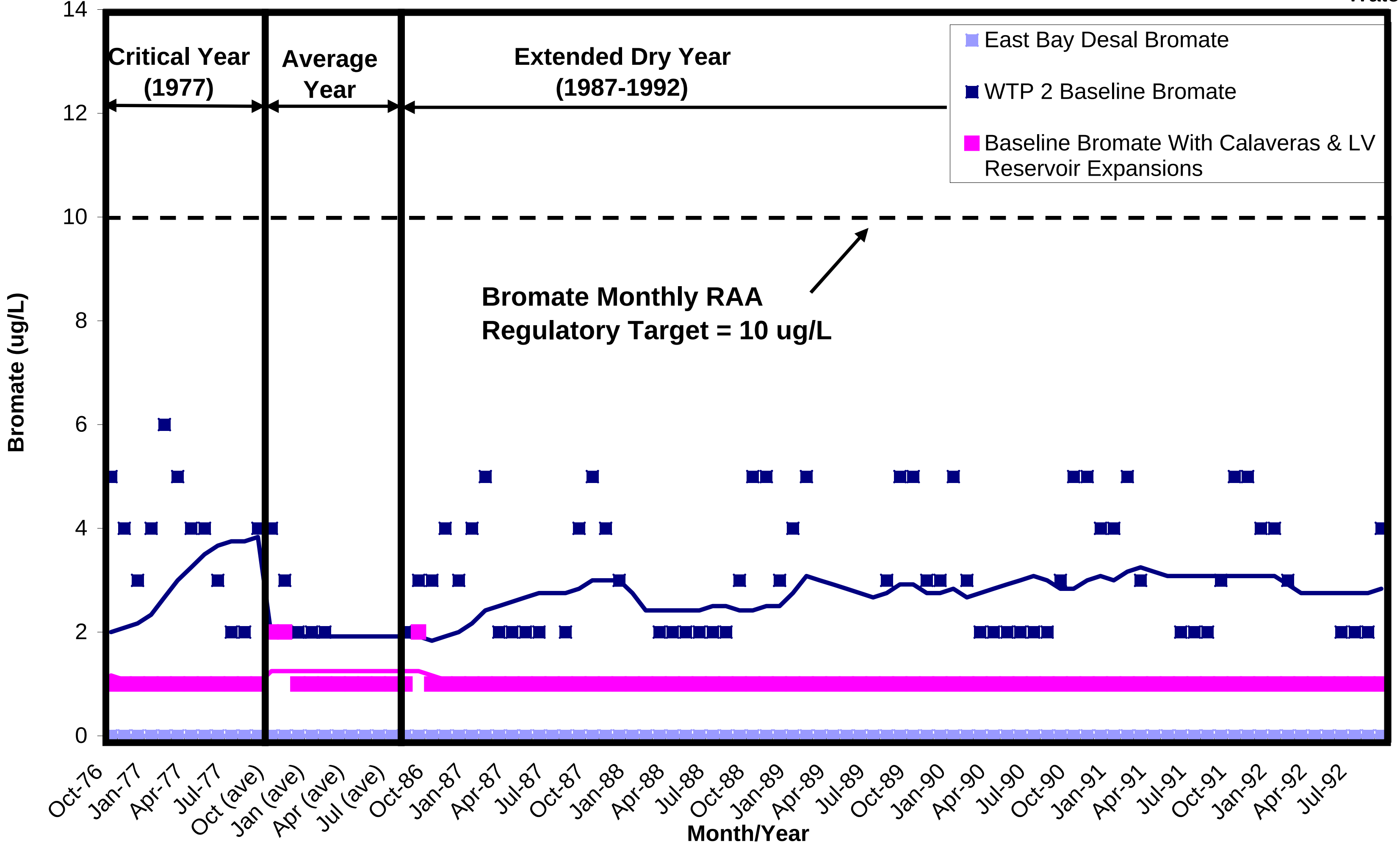


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 8:12 blend of UF:conventionally treated supplies.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline Bromate with Concept Bromate (WTP 2)

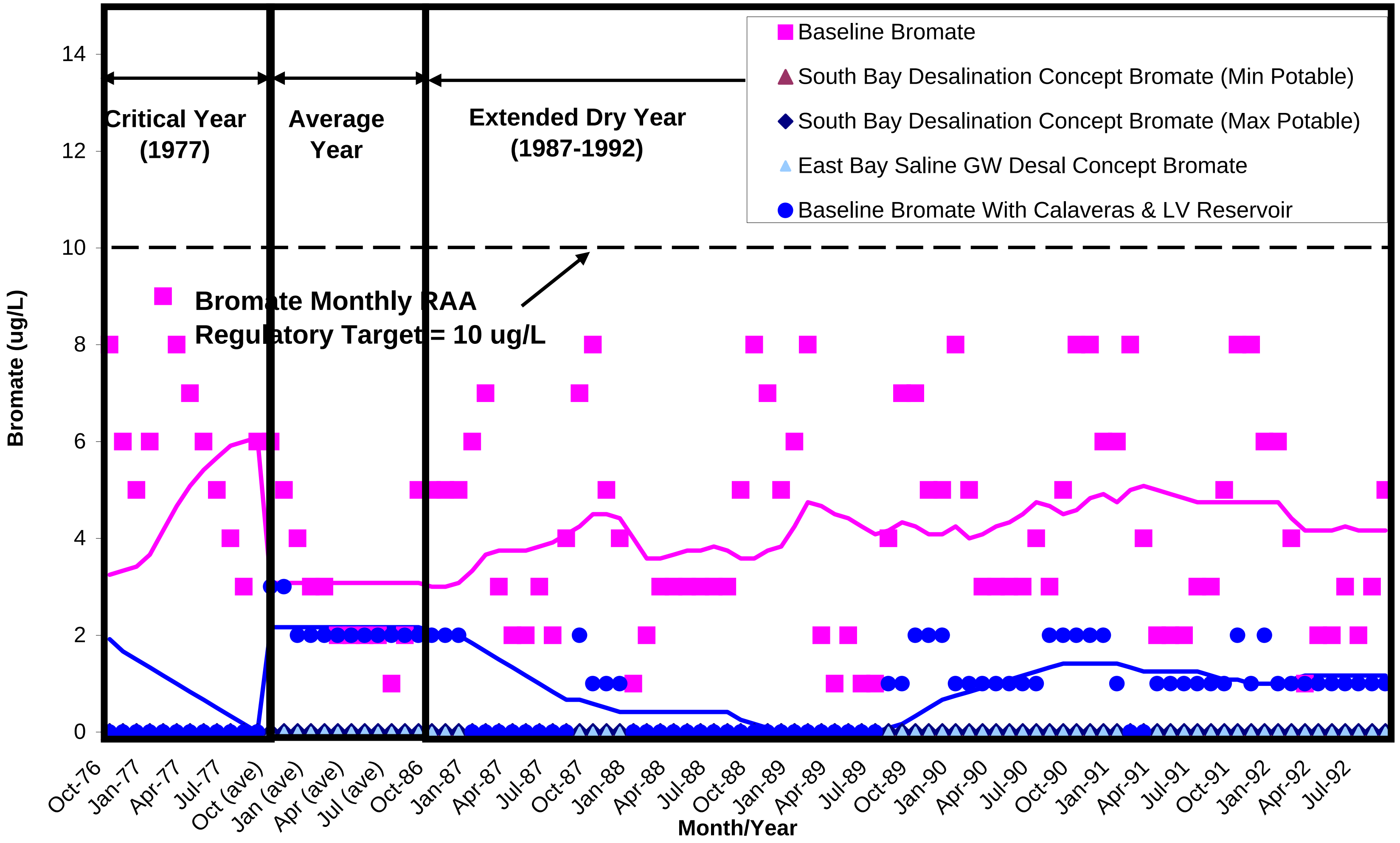


Note: East Bay Desal is not expected to generate detectable concentrations of bromate. The baseline bromate with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline Bromate with Concept Bromate

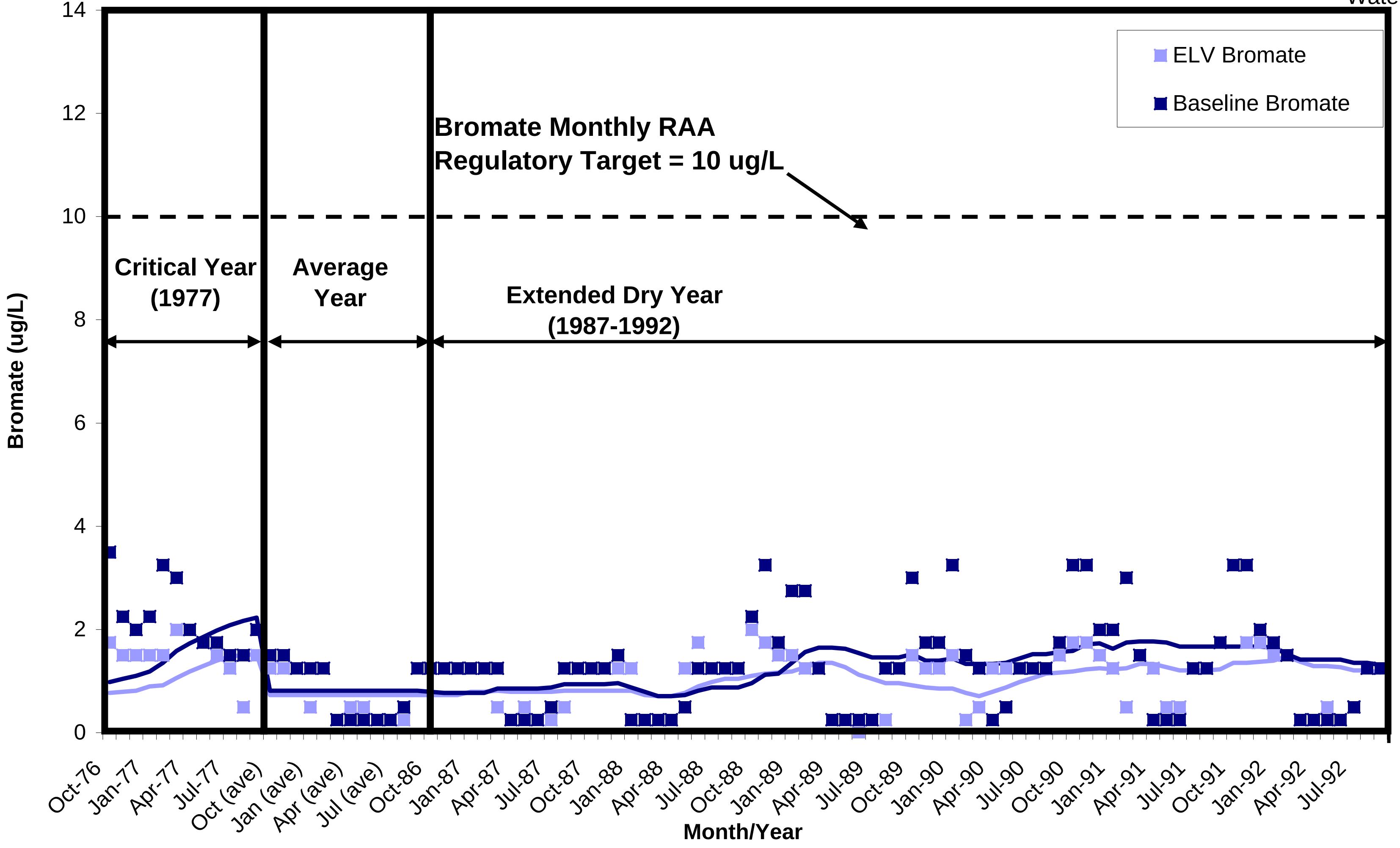


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline bromate with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production for settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Storage

Concepts Included:
Los Vaqueros Expansion
Calaveras Expansion (WS)
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline Bromate with Concept Bromate



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

G14 Maximize Water Supply Reliability with Los Vaqueros Reservoir Expansion Portfolio

G14 Example Portfolio: Maximize Water Supply with Los Vaqueros Reservoir Expansion

DESCRIPTION

The example Maximize Water Supply with Los Vaqueros Reservoir Expansion Portfolio includes six concepts: Los Vaqueros Reservoir Expansion, the Regional Desalination Project, South Bay Desalination Concept, East Bay Saline Desalination Concept, Enhanced Conservation, and Recycled Water Concepts.

In this example portfolio, Los Vaqueros Reservoir Expansion concept is included, along with all non-storage concepts with dry-year supply benefits.

All seven participating agencies are anticipated to benefit from this portfolio. Additional information on each of the included concepts is provided below.

Maximize Water Supply with Los Vaqueros Reservoir Expansion Summary

Concepts Included:

- Los Vaqueros Reservoir Expansion
- Regional Desalination Project
- South Bay Desalination
- East Bay Saline Groundwater Desalination
- Enhanced Conservation
- Water Recycling

Extended Dry Year Supply .... Up to 168,000 AFY

Average Year Water Quality Supply.............Up to 24,000 AFY

Cost ($2005)
Capital Cost ....TBD in future studies
O&M Cost ....TBD in future studies
Unit Cost..TBD in future studies

Potential Owning Agency
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC, Zone 7

Potential Partners
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC(1), Zone 7

NOTE: Supply quantities exclude RDP and Enhanced Conservation

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

Los Vaqueros Reservoir Expansion

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability Program (BAWQ&SRP), the multipurpose operating scenario for a 500,000 AF reservoir with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the BAWQ&SRP as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are Contra Costa Water District (CCWD), Alameda County Water District (ACWD), Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

Regional Desalination Project

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, that will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are CCWD, East Bay Municipal Utility District (EBMUD), SFPUC, and SCVWD. The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all-weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

South Bay Desalination Concept

The South Bay Desalination concept could involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer. The upper aquifer is currently only used for small local domestic or agricultural purposes, or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control plant (WQCP) in Palo Alto. Each of these plants is assumed to have a treated water production capacity of up to 4 MGD. The end use for the desalinated supply could be for non-potable irrigation and industrial use, or for potable use. Two different target supply and water quality ranges have been selected, corresponding to the alternatives for end use. The capacity of 4 MGD is assumed for potable supply. However, due to recycled water supplies available for irrigation and industrial uses, demand for these purposes is lower, and production capacity is assumed to be 1 MGD per plant. This portfolio includes potable supply projects at all three sites, with a potential dry-year supply benefit of 13,000 AFY and an average year water quality benefit of 8,000 AFY. Water quality benefits were only assumed for concepts that could potentially offset SCVWD surface water or groundwater. Potential project beneficiaries include SCVWD, Bay Area Water Supply and Conservation Agency (BAWSCA), and SFPUC.

❑ *East Bay Saline Groundwater Desalination Project*

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD (treated production capacity) desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the saline portion of the Newark Aquifer. Water would be extracted through a series of bay-shore perimeter wells within ACWD's service district area. Finished water could be pumped directly into ACWD's distribution system or into SFPUC's Bay Division Pipelines 1& 2 in its regional transmission system. Concentrate discharge could potentially be disposed of by delivering it to the East Bay Discharge Authority (EBDA) discharge pipeline, several miles north of the project area, or other options to be identified and evaluated during project planning. This concept has a potential dry-year supply reliability and average year water quality benefit of up to 16,000 AFY. Potential beneficiaries are ACWD (dry-year supply and average year water quality), SFPUC (dry-year supply only for retail and wholesale customers), and SCVWD (details to be developed in future studies).

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SRP. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-1 - Supply Reliability Score Card

Performance Measure/Objective	Baseline		Portfolio[1,2,3]		Baseline Plus Portfolio[1,2,3]		
	Amount or Description	Units	Agency Baseline	Units	Amount or Description	Units	Notes/Other
Meet Demands							
Critical Drought							SBA contractors, CCWD, and SFPUC (details to be developed infuture studies) are beneficiaries of the Los Vaqueros Reservoir Expansion concept. BAWSCA, SFPUC, and SCVWD are all listed as beneficiaries for the South Bay Desalination Concepts. Maximum concept yield is displayed for all agencies. SFPUC (and wholesale customers, BAWSCA agencies), SCVWD, EBMUD and CCWD will benefit from the Regional Desalination Project, though supply quantities and allocations are to be determined as part of the RDP. ACWD, BAWSCA, SCVWD (details to be developed infuture studies), and SFPUC will benefit from the East Bay Saline Groundwater Desalination facility, though allocations have not been assumed and and maximum concept yield is displayed for both agencies. All participating agencies will benefit from Enhanced Conservation though no yield has been identified for that concept. Because some agencies consider recycled water yield as necessary for meeting baseline demand, potential yields from Recycled Water concepts have been included in the Portfolio Yield column, but not in the Baseline Plus Portfolio column. For Z offset SBA supplies.
ACWD Supply	20,600	AFY	Up to 27,919	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply	137,800	AFY	Up to 65,636	AFY	Up to 167,600	AFY	
CCWD Supply	176,800	AFY	Up to 32,520	AFY	176,800	AFY	
EBMUD Supply	200,430	AFY	Up to 15,366	AFY	200,430	AFY	
SCVWD Supply	39,400	AFY	Up to 98,992	AFY	Up to 97,800	AFY	
SFPUC Supply	157,000	AFY	Up to 84,056	AFY	Up to 186,800	AFY	
Zone 7 Supply (SWP)	38,900	AFY	Up to 6,890	AFY	38,900	AFY	
Total Supply[4]	633,130	AFY	Up to 196,549	AFY	Up to 732,697	AFY	
Extended Drought							
ACWD Supply	25,500	AFY	Up to 22,933	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 65,636	AFY	Up to 239,700	AFY	
CCWD Supply	170,800	AFY	Up to 31,920	AFY	Up to 176,800	AFY	
EBMUD Supply	216,420	AFY	Up to 15,366	AFY	216,420	AFY	
SCVWD Supply	63,000	AFY	Up to 76,229	AFY	Up to 97,800	AFY	
SFPUC Supply	255,000	AFY	Up to 84,056	AFY	Up to 284,800	AFY	
Zone 7 Supply (SWP)	56,400	AFY	Up to 6,890	AFY	56,400	AFY	
Total Supply[4]	787,120	AFY	Up to 168,200	AFY	Up to 858,338	AFY	
Average Year							
ACWD Supply	42,700	AFY	Up to 17,650	AFY	42,700	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 60,136	AFY	345,000	AFY	
CCWD Supply	139,400	AFY	Up to 22,520	AFY	Up to 176,800	AFY	
EBMUD Supply	255,590	AFY	Up to 15,366	AFY	255,590	AFY	
SCVWD Supply	97,800	AFY	Up to 43,994	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	Up to 54,256	AFY	329,000	AFY	
Zone 7 Supply (SWP)	71,400	AFY	Up to 6,890	AFY	71,400	AFY	
Total Supply[4]	935,890	AFY	Up to 121,282	AFY	Up to 960,190	AFY	
Vulnerability							
ACWD	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - East Bay Saline Groundwater Desalination provides separate connection point to ACWD if South Bay Aqueduct or SFPUC supply were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
BAWSCA Agencies			Reduces Vulnerability - South Bay Desalination and potentially the Regional Desalination Project could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply.				
CCWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - South Bay Desalination concepts could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply, but only a small fraction of SCVWD customers could be served. Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply. Effect of East Bay Saline Groundwater Desalination on vulnerability to be determined in future studies.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		Reduces Vulnerability - East Bay Saline Groundwater Desalination could provide small supply source to retail and wholesale customers in the event of a supply disruption on the Hetch Hetchy Aqueduct. Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption on the Hetch Hetchy Aqueduct, though supply quantities and conveyance mechanisms are to be determined by the RDP. South Bay Desalination could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption on the Hetch Hetchy Aqueduct, but only a small fraction of SFPUC customers could be served.				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		No Effect on Vulnerability - Since concepts provide non-potable supplies or augment existing supplies, they do not reduce the vulnerability of Zone 7 potable system.				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - South Bay Desalination, Regional Desalination Project, East Bay Saline Groundwater Desalination, Water Recycling Concepts and Enhanced Conservation would b locally controlled.							

1. Some agencies include recycled water supplies in future supply projections. As a result, recycled water has not been considered as an additional supply, and does not result in an increased total supply as compared to baseline.

2. Supply quantities and allocations for the Regional Desalination facility(ies) are to be determined by the Regional Desalination Project, and are not included in these numbers.

3. ACWD baseline SWP supply numbers are based on SBA delivery information generated by internal District modeling conducted after the Los Vaqueros Expansion studies modeling used in this study. Los Vaqueros Reservoir Expansion concept supply quantities to all agencies, including ACWD, are based on Los Vaqueros Reservoir Expansion Studies modeling. Concept and Baseline plus Concept delivery quantities to ACWD reflect Los Vaqueros Expansion Studies modeling baseline supplies of 20,000, 30,000, and 34,900 AFY for critical dry, extended dry, and average years, as opposed to the District-furnished supply baselines of 20,600, 25,500 and 42,700 AFY, respectively.

4. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-2 - Public Health Protection Scorecard (Page 1 of 2)[1]

Performance Measure/Objective	Portfolio		Agency Baseline[1]		Notes
	Source Water	Treated Water	Source Water	Treated Water	
Variability for Treatment					
ACWD	Reduces Variability	NA	Reduces Variability	NA	East Bay Saline Groundwater Desalination Concept and Los Vaqueros Reservoir Expansion will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	Reduces Variability	NA	Reduces Variability	NA	South Bay Desalination, East Bay Saline Groundwater Desalination, and Los Vaqueros Reservoir Expansion Concepts will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Los Vaqueros Reservoir Expansion somewhat increases variability for treatment. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Los Vaqueros Reservoir Expansion concept, East Bay Saline Groundwater Desalination, and South Bay Desalination Concepts will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2,3]	NA	TBD[2,3]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, effect of Los Vaqueros Reservoir Expansion will depend on operation and conveyance.
Zone 7	Reduces Variability	NA	Reduces Variability	NA	Los Vaqueros Reservoir Expansion Concept reduces variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
Total Dissolved Solids					
ACWD	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Los Vaqueros Reservoir Expansion and East Bay Saline Groundwater Desalination Concepts will reduce TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Los Vaqueros Reservoir Expansion will reduce TDS. South Bay Desalinated supply for potable use will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansion will not significantly affect TDS over all. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansions will reduce TDS. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalination will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2,3]	TBD[2,3]	TBD[2,3]	TBD[2,3]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Effect of Los Vaqueros Reservoir Expansion will depend on operation and conveyance. East Bay Saline Groundwater Desalination will be treated to SFPUC TDS levels. South Bay Desalinated supply for potable use will be treated to match existing TDS.
Zone 7	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Los Vaqueros Reservoir Expansion will reduce TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
Disinfection By-Products					
ACWD	NA	Reduces DBPs	NA	Reduces DBPs	Los Vaqueros Reservoir Expansion and East Bay Saline Groundwater Desalination Concept will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	Reduces DBPs	NA	Reduces DBPs	Los Vaqueros Reservoir Expansion and South Bay Desalinated supply for potable use will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansion will have minimal effect on DBPs. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansion and South Bay Desalinated supply for potable use will reduce DBPs. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2,3]	TBD[2,3]	TBD[2,3]	TBD[2,3]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Effect of Los Vaqueros Reservoir Expansion will depend on operation and conveyance. East Bay Saline Groundwater Desalination and South Bay Desalination will reduce DBPs.
Zone 7	NA	Reduces DBPs	NA	Reduces DBPs	Los Vaqueros Reservoir Expansion will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part of the RDP.
3. Effect of SFPUC participation in the Los Vaqueros Expansion project to be determined in future studies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-2 - Public Health Protection Scorecard (Page 2 of 2) [1]

Performance Measure/Objective	Portfolio		Agency Baseline[1]		Notes
	Source Water	**Treated Water**	**Source Water**	**Treated Water**	
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	Improves T&O	NA	Improves T&O	Los Vaqueros Reservoir Expansion and East Bay Saline Groundwater Desalination Concept will improve overall quality and taste and odor.
BAWSCA Agencies	NA	Improves T&O	NA	Improves T&O	Los Vaqueros Reservoir Expansion and South Bay Desalinated supply for potable use will improve overall water quality and improve taste and odor.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalination will improve overall quality and taste and odor. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2,3]	TBD[2,3]	TBD[2,3]	TBD[2,3]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination and South Bay Desalination concepts will slightly improve overall quality and taste and odor. Effect of Los Vaqueros Reservoir Expansion will depend on operation and conveyance.
Zone 7	NA	NA	NA	Improves T&O	Los Vaqueros Reservoir Expansion will improve taste and odor. Recycled water projects are assumed to have no benefit or impact to potable water quality.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Los Vaqueros Reservoir Expansion, East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water quality from known contaminants (e.g., TDS).
BAWSCA Agencies	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Los Vaqueros Reservoir Expansion, East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water from known contaminants (e.g., TDS).
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansion is not expected to degrade taste and odor from known contaminants. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Los Vaqueros Reservoir Expansion is not expected to degrade taste and odor from known contaminants. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use, East Bay Saline Groundwater Desalination, and recycled water supplies are no projected to degrade water quality from known contaminants (e.g., TDS).
SFPUC	TBD[2,3]	TBD[2,3]	TBD[2,3]	TBD[2,3]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination, South Bay Desalination and recycled water concepts are not projected to degrade water quality from known contaminants (e.g., TDS). Effect of Los Vaqueros Reservoir Expansion will depend on operation and conveyance.
Zone 7	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Los Vaqueros Reservoir Expansion is not expected to degrade taste and odor from known contaminants. Recycled water projects are not projected to degrade potable water quality from known contaminants.
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	TBD[4]	TBD[4]	TBD[4]	TBD[4]	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with advanced treatment, emerging contaminants including NDMA and pharmaceuticals may be introduced into the groundwater basin due to usage of recycled water. Emerging contaminants such as algal biotoxins may be a factor with desalinated seawater supplies and the Calaveras Reservoir Expansion (increased potential for algal blooms in the expanded reservoir). Algal biotoxin potential in the expanded Los Vaqueros Reservoir is actively being studied by the LVE Project Team.
BAWSCA Agencies	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
SFPUC	TBD[2,3]	TBD[2,3]	TBD[2,3]	TBD[2,3]	
Zone 7	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part of the RDP.
3. Effect of SFPUC participation in the Los Vaqueros Expansion project to be determined in future studies.
4. To be determined in future studies.

Table G14-2a - Public Health Protection Score Card by Agency

Agency: ACWD

			Agency Baseline[1]			**Concept: East Bay Saline Groundwater Desalination[2]**		**Agency Baseline Plus Portfolio[1]**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (MSJWTP)**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (WTP 2)**	**Notes**
Supply Quantity											
Critical Year		AFY	20,600			16,000		30,300			
Extended Dry Year		AFY	25,500			16,000		35,300			
Average Year		AFY	42,700			16,000		34,900			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 -0.53	0.12 -0.41	0.15 -0.48	NA	0.02	0.09 - 0.24	0.06 - 0.17	0.08 - 0.21	
	Mean	mg/L	0.37	0.28	0.33	NA	0.02	0.12	0.08	0.11	
TOC	Range	mg/L	3.4 -7.3333	2.9 -6.4	2.3 -5.5	NA	0.1	1.8 - 3.4	2.8 - 4.2	2.2 - 3.5	
	Mean	mg/L	5.06	4.38	3.7	NA	0.1	2.4	3.3	2.7	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	constant	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 -0.506	0.03 -0.413	0.04 -0.47	NA	0.02	0.02 - 0.44	0.01 - 0.36	0.02 - 0.41	
	Mean	mg/L	0.26	0.20	0.23	NA	0.02	0.15	0.11	0.13	
TOC	Range	mg/L	1.6 -7.3	1.3 -6.4	0.9 -5.5	NA	0.1	1.6 - 6.3	1.8 - 5.7	1.4 - 4.8	
	Mean	mg/L	3.7	3.17	2.6	NA	0.1	2.7	3.0	2.5	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	constant	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 -0.38	0.05 -0.31	0.07 -0.35	NA	0.02	0.10 - 0.15	0.07 - 0.11	0.09 - 0.13	
	Mean	mg/L	0.19	0.14	0.17	NA	0.02	0.12	0.09	0.11	
TOC	Range	mg/L	2.8 -5.9	2.4 -5.1	1.9 -4.3	NA	0.1	1.6 - 1.6	2.7 - 2.7	2.2 - 2.2	
	Mean	mg/L	4.0	3.4	2.8	NA	0.1	1.6	2.7	2.2	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	constant	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 -704	298 -727	307 -736	NA	40	187 - 355	209 - 377	218 - 386	
	Mean	mg/L	507	529	561	NA	40	221	243	252	
Extended Dry Year	Range	mg/L	166 -675	188 -697	197 -706	NA	40	147 - 597	169 - 619	178 - 628	
	Mean	mg/L	384	406	438	NA	40	253	276	285	
Average Year	Range	mg/L	180 -528	202 -550	211 -559	NA	40	192 - 251	214 - 274	223 - 282	
	Mean	mg/L	296	319	350	NA	40	218	241	249	
Disinfection Byproducts											
Critical Year											
Bromate	Range	mg/L	NA	ND -ND	2 -6	NA	ND	NA	ND - ND	1 - 3	
	Mean	mg/L	NA	ND	4	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	82 -153	26 -42	NA	ND	NA	69 - 103	22 - 31	
	Mean	mg/L	NA	110	33	NA	ND	NA	80	25	
THM4	Range	ug/L	NA	47 -75	16 -21	NA	1	NA	54 - 69	18 - 22	
	Mean	mg/L	NA	61	19	NA	1	NA	59	19	
Extended Dry Year											
Bromate	Range	mg/L	NA	ND -ND	1 -5	NA	ND	NA	ND - ND	0.0 - 5	
	Mean	mg/L	NA	ND	3	NA	ND	NA	ND	2	
THM4	Range	mg/L	NA	50 -142	16 -38	NA	ND	NA	47 - 132	16 - 37	
	Mean	mg/L	NA	83	26	NA	ND	NA	76	24	
HAA5	Range	mg/L	NA	22 -92	11 -26	NA	1	NA	35 - 78	15 - 25	
	Mean	mg/L	NA	52	17	NA	1	NA	55	18	
Average Year											
Bromate	Range	mg/L	NA	ND -ND	1 -4	NA	ND	NA	ND - ND	1.0 - 2	
	Mean	mg/L	NA	ND	2	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	68 -116	21 -33	NA	ND	NA	68 - 71	21 - 23	
	Mean	mg/L	NA	85	26	NA	ND	NA	70	22	
HAA5	Range	mg/L	NA	41 -74	14 -22	NA	1	NA	50 - 53	17 - 18	
	Mean	mg/L	NA	57	19	NA	1	NA	51	18	
Taste and Odor								p			
Source of water	Qual		NA	NA	NA	NA	NA	quality	improved T&O	improved T&O	
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	

1. ACWD baseline SWP supply numbers are based on SBA delivery information generated by internal District modeling conducted after the Los Vaqueros Expansion studies modeling used in this study. Los Vaqueros Reservoir Expansion concept supply quantities t

2. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-2b - Public Health Protection Score Card by Agency

Agency: SCVWD

			Agency Baseline		Concept: East Bay Saline Groundwater Desalination[1]		Concept: South Bay Desalination (Potable)[2]		Concept: South Bay Desalination (Irrigation)[3]		Baseline Plus Portfolio		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination (Potable) Treated Water**	**South Bay Desalination (Non-potable) Source Water**	**South Bay Desalination (Non-Potable) Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source**	**Los Vaqueros Expansion plus Agency Baseline Treated**	**Notes**
Supply Quantity													
Critical Year		AFY	39,400		16,000		13,800		3,200		88,900		
Extended Dry Year		AFY	63,000		16,000		13,800		3,200		89,700		
Average Year		AFY	97,800		16,000		8,300		3,200		97,800		
Variability for Treatment													
Critical Year													
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.02	NA	0.03 - 0.13	NA	0.13 0.22	0.09 - 0.24	0.06 - 0.17	
	Mean	mg/L	0.37	0.33	NA	0.02	NA	0.08	NA	0.17	0.12	0.08	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.1	NA	0.2 - 0.9	NA	0.9 1.5	1.8 - 3.4	2.8 - 4.2	
	Mean	mg/L	5.1	3.9	NA	0.1	NA	0.6	NA	1.2	2.4	3.3	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	variable	less variable	Temperature variations are seasonal
Extended Dry Year													
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.02	NA	0.03 - 0.13	NA	0.13 0.22	0.02 - 0.44	0.01 - 0.36	
	Mean	mg/L	0.26	0.24	NA	0.02	NA	0.08	NA	0.17	0.15	0.11	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.1	NA	0.2 - 0.9	NA	0.9 1.5	1.6 - 6.3	1.8 - 5.7	
	Mean	mg/L	3.7	2.7	NA	0.1	NA	0.6	NA	1.2	2.7	3.0	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	variable	less variable	Temperature variations are seasonal
Average Year													
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.02	NA	0.03 - 0.13	NA	0.13 0.22	0.10 - 0.15	0.07 - 0.11	
	Mean	mg/L	0.19	0.17	NA	0.02	NA	0.08	NA	0.17	0.12	0.09	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.1	NA	0.2 - 0.9	NA	0.9 1.5	1.6 - 1.6	2.7 - 2.7	
	Mean	mg/L	4.0	3.0	NA	0.1	NA	0.6	NA	1.2	1.6	2.7	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	variable	less variable	Temperature variations are seasonal
Total Dissolved Solids													
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	40	NA	40 - 280	NA	290 500	187 - 355	206 - 375	
	Mean	mg/L	507	527	NA	40	NA	160	NA	395	221	241	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	40	NA	40 - 280	NA	290 500	147 - 597	167 - 617	
	Mean	mg/L	384	404	NA	40	NA	160	NA	395	253	273	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	40	NA	40 - 280	NA	290 500	192 - 251	211 - 271	
	Mean	mg/L	296	316	NA	40	NA	160	NA	395	218	238	
Minimize Disinfection Byproducts													
Critical Year													
Bromate	Range	mg/L	NA	3 - 9	NA	ND	NA	ND - ND	NA	ND ND	NA	2 - 4	
	Mean	mg/L	NA	6	NA	ND	NA	ND	NA	ND	NA	2	
THM4	Range	mg/L	NA	27 - 44	NA	ND	NA	1 - 6	NA	6 11	NA	22 - 32	
	Mean	mg/L	NA	34	NA	ND	NA	1	NA	6	NA	25	
HAA5	Range	mg/L	NA	11 - 14	NA	1	NA	2 - 7	NA	7 11	NA	12 - 14	
	Mean	mg/L	NA	13	NA	1	NA	2	NA	7	NA	13	
Extended Dry Year													
Bromate	Range	mg/L	NA	1 - 8	NA	ND	NA	ND - ND	NA	ND ND	NA	0 - 7	
	Mean	mg/L	NA	4	NA	ND	NA	ND	NA	ND	NA	3	
THM4	Range	mg/L	NA	16 - 40	NA	ND	NA	1 - 6	NA	6 11	NA	16 - 39	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	NA	24	
HAA5	Range	mg/L	NA	7 - 18	NA	1	NA	2 - 7	NA	7 11	NA	10 - 16	
	Mean	mg/L	NA	11	NA	1	NA	2	NA	7	NA	12	
Average Year													
Bromate	Range	mg/L	NA	1 - 6	NA	ND	NA	ND - ND	NA	ND ND	NA	2 - 3	
	Mean	mg/L	NA	3	NA	ND	NA	ND	NA	ND	NA	2	
THM4	Range	mg/L	NA	22 - 34	NA	ND	NA	1 - 6	NA	6 11	NA	22 - 23	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	NA	23	
HAA5	Range	mg/L	NA	9 - 15	NA	1	NA	2 - 7	NA	7 11	NA	11 - 12	
	Mean	mg/L	NA	12	NA	1	NA	2	NA	7	NA	12	
Minimize Taste and Odor													
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	NA	improved overall quality	
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	NA	NA	minimal likelihood	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.
2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.
3. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-2c - Public Health Protection Score Card by Agency

Agency: SFPUC

			Agency Baseline		Concept: East Bay Saline Groundwater Desalination[1]		Concept: South Bay Desalination (Potable)[2]		Concept: South Bay Desalination (Irrigation) Non-potable[3]		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SFPUC Source Water**	**SFPUC Treated Water**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination (Potable) Treated Water**	**South Bay Desalination (Non-potable) Concept Source Water**	**South Bay Desalination (Non-potable) Concept Treated Water**	**Notes**
Supply Quantity											
Critical Year		AFY	157,000		16,000		13,800		3,200		
Extended Dry Year		AFY	255,000		16,000		13,800		3,200		
Average Year		AFY	329,000		0		0		3,200		
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	
	Mean	mg/L	0.01	0.01	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	
	Mean	mg/L	1.7	1.6	NA	0.1	NA	0.6	NA	1.2	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40	NA	40 - 280	NA	290 - 500	
	Mean	mg/L	26	26	NA	40	NA	160	NA	395	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40	NA	40 - 280	NA	290 - 500	
	Mean	mg/L	42	42	NA	40	NA	160	NA	395	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40	NA	40 - 280	NA	290 - 500	
	Mean	mg/L	40	40	NA	40	NA	160	NA	395	
Disinfection Byproducts											
Critical Year											
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	34 - 47	NA	ND	NA	1 - 6	NA	6 - 11	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	
HAA5	Range	ug/L	NA	28 - 40	NA	1	NA	2 - 7	NA	7 - 11	
	Mean	mg/L	NA	32	NA	1	NA	2	NA	7	
Extended Dry Year											
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	33 - 50	NA	ND	NA	1 - 6	NA	6 - 11	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	24 - 44	NA	1	NA	2 - 7	NA	7 - 11	
	Mean	mg/L	NA	30	NA	1	NA	2	NA	7	
Average Year											
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	24 - 43	NA	ND	NA	1 - 6	NA	6 - 11	
	Mean	mg/L	NA	33	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	22 - 34	NA	1	NA	2 - 7	NA	7 - 11	
	Mean	mg/L	NA	28	NA	1	NA	2	NA	7	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.
2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.
3. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-2d - Public Health Protection Score Card by Agency

Agency: Zone 7

			Agency Baseline			**Agency Baseline Plus Portfolio**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (PPWTP)**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (DVWTP)**	**Notes**
Supply Quantity									
Critical Year		AFY	38,900			38,900			Zone 7 is not interested in additional dry year supply. Water taken from this concept would offset SBA supplies.
Extended Dry Year		AFY	56,400			56,400			
Average Year		AFY	71,400			71,400			
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	0.09 - 0.24	0.09 - 0.24	0.09 - 0.24	
	Mean	mg/L	0.37	0.30	0.30	0.12	0.12	0.12	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	1.8 - 3.4	1.8 - 3.4	1.8 - 3.4	
	Mean	mg/L	5.1	4.5	4.7	2.4	2.4	2.4	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	0.02 - 0.44	0.02 - 0.44	0.02 - 0.44	
	Mean	mg/L	0.26	0.21	0.21	0.15	0.15	0.15	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	1.6 - 6.3	1.6 - 6.3	1.6 - 6.3	
	Mean	mg/L	3.7	3.4	3.4	2.7	2.7	2.7	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	0.10 - 0.15	0.10 - 0.15	0.10 - 0.15	
	Mean	mg/L	0.19	0.15	0.15	0.12	0.12	0.12	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	1.6 - 1.6	1.6 - 1.6	1.6 - 1.6	
	Mean	mg/L	4.0	3.7	3.7	1.6	1.6	1.6	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	variable	less variable	less variable	
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	187 - 355	196 - 365	196 - 365	
	Mean	mg/L	507	517	517	221	231	231	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	147 - 597	157 - 607	157 - 607	
	Mean	mg/L	384	394	394	253	263	263	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	192 - 251	201 - 261	201 - 261	
	Mean	mg/L	296	306	306	218	228	228	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	ND	ND	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	55 - 81	56 - 84	
	Mean	ug/L	NA	86	89	NA	63	65	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	39 - 51	40 - 52	
	Mean	ug/L	NA	44	46	NA	43	44	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	ND	ND	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	38 - 105	40 - 108	
	Mean	ug/L	NA	67	67	NA	60	61	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	29 - 59	31 - 60	
	Mean	ug/L	NA	39	39	NA	40	41	
Average Year									
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	ND	ND	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	54 - 56	55 - 57	
	Mean	ug/L	NA	68	69	NA	55	56	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	36 - 38	37 - 39	
	Mean	ug/L	NA	43	43	NA	37	38	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved overall quality	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-2e - Public Health Protection Score Card by Agency

Agency: CCWD

			Agency Baseline		**Baseline Plus Portfolio**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**CCWD Source Water**	**CCWD Treated Water[1]**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water[1]**	**Notes**
Supply Quantity							
Critical Year		AFY	176,800		186,800		
Extended Dry Year		AFY	170,800		180,200		
Average Year		AFY	139,400		139,400		
Minimize Variability for Treatment							
Critical Year							
Bromide	Range	mg/L	0.22 - 0.66	0.16 - 0.58	0.15 - 0.39	0.10 - 0.31	
	Mean	mg/L	0.43	0.35	0.26	0.20	
TOC	Range	mg/L	2.6 - 5.4	1.8 - 4.2	3.1 - 6.1	2.2 - 4.8	
	Mean	mg/L	4.0	3.0	3.9	2.9	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Extended Dry Year							
Bromide	Range	mg/L	0.04 - 0.65	0.03 - 0.57	0.04 - 0.62	0.03 - 0.54	
	Mean	mg/L	0.25	0.20	0.19	0.14	
TOC	Range	mg/L	2.2 - 7.6	1.4 - 6.1	2.2 - 7.6	1.4 - 6.1	
	Mean	mg/L	3.8	2.7	3.7	2.7	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Average Year							
Bromide	Range	mg/L	0.07 - 0.27	0.05 - 0.22	0.06 - 0.22	0.03 - 0.17	
	Mean	mg/L	0.17	0.12	0.14	0.10	
TOC	Range	mg/L	2.7 - 6.3	1.8 - 4.9	2.7 - 6.4	1.8 - 5.0	
	Mean	mg/L	3.7	2.7	3.8	2.8	
pH	Qual		somewhat variable	constant	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	variable	less variable	Temperature variations are seasonal
Minimize Total Dissolved Solids							
Critical Year	Range	mg/L	334 - 856	355 - 877	245 - 532	266 - 554	
	Mean	mg/L	580	601	384	405	
Extended Dry Year	Range	mg/L	159 - 842	181 - 863	158 - 812	179 - 834	
	Mean	mg/L	370	392	299	321	
Average Year	Range	mg/L	176 - 398	198 - 419	168 - 331	189 - 352	
	Mean	mg/L	273	295	243	265	
Minimize Disinfection Byproducts							
Critical Year							
Bromate	Range	ug/L	NA	2 - 4	NA	1 - 2	
	Mean	ug/L	NA	2	NA	2	
THM4	Range	ug/L	NA	54 - 82	NA	55 - 84	
	Mean	ug/L	NA	68	NA	63	
HAA5	Range	ug/L	NA	19 - 26	NA	22 - 28	
	Mean	ug/L	NA	23	NA	24	
Extended Dry Year							
Bromate	Range	ug/L	NA	0.3 - 3	NA	ND - 3	
	Mean	ug/L	NA	1	NA	1	
THM4	Range	ug/L	NA	41 - 92	NA	42 - 87	
	Mean	ug/L	NA	60	NA	57	
HAA5	Range	ug/L	NA	18 - 33	NA	19 - 34	
	Mean	ug/L	NA	25	NA	25	
Average Year							
Bromate	Range	ug/L	NA	0.3 - 2	NA	ND - 1	
	Mean	ug/L	NA	1	NA	1	
THM4	Range	ug/L	NA	48 - 0	NA	44 - 75	
	Mean	ug/L	NA	57	NA	55	
HAA5	Range	ug/L	NA	21 - 31	NA	21 - 32	
	Mean	ug/L	NA	25	NA	26	
Minimize Taste and Odor							
Source of water	Qual		NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal likelihood	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Assumes 75% Bollman, 25% Randall Bold blend.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	Portfolio Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Los Vaqueros Reservoir Expansion: CALFED Los Vaqueros Expansion Studies (CALFED, 2004) project capital costs of $1290 M and operating costs of $27.5 M ($2008). Calaveras capital costs are estimated at $426 M, with operating costs estimated as $3.5 M per year ($2003). Regional Desalination Project: Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. East Bay Saline Groundwater Desalination: East Bay Saline Groundwater Desalination facilities are estimated as $75 million ($2005). South Bay Desalination: South Bay Desalination facility capital costs are estimated at $14 to $138 million, and O&M costs at $3 to $10 million ($2005), depending on selected water quality targets. Water Recycling: Recycled water capital costs are estimated as $839 million ($2005). Enhanced Conservation: No cost estimates are available for Enhanced Conservation.
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	Allocation of Costs will not be determined as part of this study.
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): TBD[1].** Overall impacts for ELV would be low as terrestrial effects associated with reservoir expansion (from inundation of biological resources) would be offset by benefits to aquatic resources. Therefore, the level of impact associated with the RDP in combination with the other concepts would be important in determining the overall impact of this portfolio. The level of impact associated with the RDP is not known but would depend on the location and operations of the facility. In general, if the RDP is sited in an area of sensitive habitat and would require construction and operation of a surface water intake, potential adverse effects to aquatic and wetland resources would occur. In addition, brackish and seawater desalination plants consumes large amount of energy. Depending on the location of other facilities (e.g., recycling plant, conveyance facilities, interties), potential effects to biological resources could occur; however, these facilities would be located in disturbed areas to the extent feasible, thus reducing their potential for adverse impacts. The South Bay Desalination plants would unlikely affect biological resources as they would be located in existing, disturbed areas. **Overall Impacts to the Environment (After Mitigation): TBD[1].** Mitigation opportunities would be developed to reduce high impacts to the environment. For LVE, the mitigation strategy includes restoration and enhancement of both existing watershed lands and other lands, as well as acquisition of additional land for protection, restoration, and / or enhancement. For the RDP, these opportunities would depend on the location, but could include the design of the water intake with state-of-the-art screens to reduce entrainment/impingement of aquatic resources, use of energy recovery devices or participation in PG&E voluntary programs to reduce energy consumption, and administration of relevant studies on the potential effects to aquatic resources. In general, mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources for all portfolio facilities include, but are not limited to, alternative siting of facilities to avoid sensitive resources, preconstruction surveys, implementation of standard BMPs, restriction on construction schedule, monitoring, and if necessary, acquisition of regulatory permits and implementation of regulatory permit conditions.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): High Benefits.** ELV would be considered a benefit Delta resources because it would reduce direct fish losses from water diversions through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). The benefits associated with the RDP would depend on the location and operation of the desalination facilities. If any of the concept reduces spring pumping from the Delta (e.g., East Bay Desalination), there would be environmental benefits to the Delta. Reuse of water through water recycling and conservation are considered a benefit to the environment because it reduces demand on new water supplies, and thus construction- and operation-related effects on the environment. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Mitigation acreage requirements for ELV would range from 1,953 to 8,576 acres, thus increasing the amount of overall protected, enhanced, or restored habitat.	
Implementation Potential		
External Support[2]	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated	
Ability to Get Outside Funding[2]	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
Consistency with Local and Regional Plans[2]	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	7	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	6,300,000 people	

1. To be determined in future studies.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G14-4 - Environmental Score Card (Page 1 of 2)

Performance Measure/Objective	**Portfolio Rating**
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): TBD.** Effects to aquatic resources would be largely influenced by the combination of ELV with the RDP (other concepts would result in minor effects or limited benefits). ELV would reduce direct fish losses from water diversions through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield), and thus considered a benefit to aquatic resources. Depending on the location and operations of the RDP, there is a possibility that the RDP could offset some of the benefits from ELV. Impacts to aquatic environment from the location and operations of the RDP have not been determined. Potential long-term, adverse effects to aquatic resources associated with operation of the desalination plant using surface water intakes occur from entrainment and impingement, and discharge of brine. Brine discharge from the RDP would likely be combined with either wastewater effluent or blow-down water from the power plant; adverse effects would unlikely occur if the combined brine discharge complies with NPDES standards. Operational impacts to aquatic resources are not expected from the East Bay Saline Groundwater and South Bay Desalination concepts, as these facilities would use groundwater as the source water (thus eliminating potential effects to surface aquatic resources). Brine from these facilities would be combined with effluent or power plant blow-down water such that the brine would be mixed and diluted prior to discharge. If the East Bay Desalination supply offsets SBA supply during normal years, there may be a reduction in spring and summer pumping from the Delta and thus benefits to Delta resources. Other minor potential effects on the aquatic environment are associated with improperly treated reclaimed water being discharged into biological sensitive areas (for recycling concepts), and general construction activities that could increase stormwater runoff to nearby creeks and drainages, and thus affect aquatic resources (for all concepts). **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this will require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions. In addition, continue trout planting. Mitigation opportunities for the RDP would depend on its location, and could include, but not be limited to, design of the intake with state-of-the-art screens and administration of relevant studies on the potential effects to aquatic resources. For the RDP, where sensitive resources would be affected, then the following would apply: consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. General mitigation opportunities to reduce short-term construction effects (for all concepts) include, but are not limited to, implementation of standard BMPs (e.g., sediment and erosion control), and restriction on construction schedule (e.g,. avoid construction activities in creeks during the wet season).
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Construction and Operation of ELV would affect approximately 2,500 acres of terrestrial habitats, including: grassland, oak woodland, upland scrub, riparian, urban-ruderal, and agriculture. Impacts to the terrestrial environment from development of all other concepts would depend on the location of the facilities. South Bay Desalination treatment facilities would be located on existing, disturbed areas (e.g., power plants or the WQCP) and is not expected to result in adverse effects to terrestrial resources. Where facilities are not known (e.g., RDP, East Bay Saline Groundwater Desalination facilities, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to sensitive terrestrial habitat could occur if facilities are located on these resources. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities for long-term effects to the terrestrial environment would be avoidance of sensitive terrestrial habitat to the extent possible through alternative siting. For ELV, the mitigation strategy includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres. The protection, restoration, and/or enhancement of land would be a benefit. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operation. General mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources include, but are not limited to, implementation of standard BMPs (e.g., fence sensitive terrestrial habitats to ensure avoidance), and acquisition of regulatory permits and compliance with permit conditions.

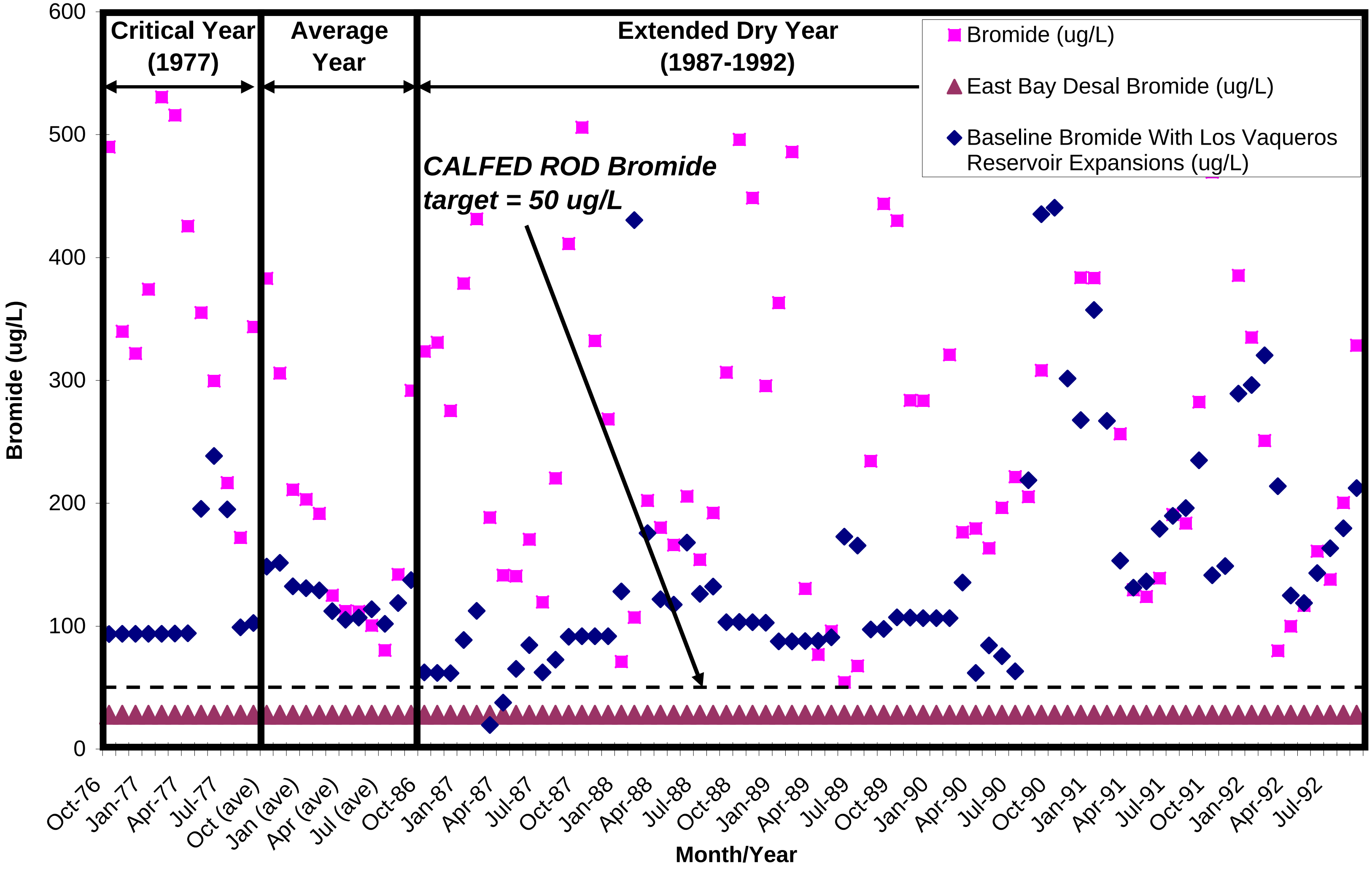
Table G14-4 - Environmental Score Card (Page 2 of 2)

Performance Measure/Objective	Portfolio Rating
Wetlands	
Potential Impacts to Wetland Resources (acreage affected, mitigation)	**Effects on Wetlands (Before Mitigation): TBD.** Because expansion of Los Vaqueros Reservoir would affect minimal amount of wetland resources (1.3 acres), it would be important to consider the effects of other facilities, including the RDP. Impacts to wetland resources from other facilities development would depend on the location of the individual concept facilities. Although the location of the RDP has not been determined, potential wetlands could be adversely affected if the plant or intake pipelines occur through wetlands. A series of bay shore perimeter wells would be developed as part of the East Bay Saline Groundwater Desalination concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. The South Bay Desalination plants would be located within existing, disturbed areas (e.g., power plant, WQCP). Recycled water project facilities have not yet been determined but would likely be located in disturbed areas to avoid wetland resources to the extent feasible. Construction of conveyance facilities and interties for all concepts may temporarily affect wetland resources (e.g., creek crossing). **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce adverse effects to wetland resources would be avoidance to the extent possible through alternative siting. If wetlands resources are affected, they would typically be replaced at a ratio of 3:1 or at a ratio deemed appropriate by regulatory agencies. Consultation with regulatory agencies, permit acquisition, and compliance with permit conditions would be required. For LVE, the mitigation strategy identified for Terrestrial Resources, above, would also apply to impacts on wetlands. Mitigation opportunities have not been identified for the RDP; they would be determined based on the RDP's location and operations. General mitigation opportunities to reduce short-term construction and potentially long-term effects to wetland resources include, but are not limited to, delineation of wetlands, implementation of standard BMPs (e.g., installation of silt fence to prevent runoff into wetlands), restriction on construction schedule (limit construction through creeks during dry seasons only), and monitoring.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** Impacts to special-status plant and wildlife species from development of all concepts would depend on the habitat affected, which is determined by the location of the concept facilities. Expansion of Los Vaqueros Reservoir could affect the following species: San Joaquin kit fox, California red-legged frog, California tiger salamander, Western pond turtle, Bald eagle, Curved-foot hygrotis diving beetle, Mason's lilaeopsis, Alkali milk-vetch, Heartscale, Brittlescale, San Joaquin spearscale, Recurved Larkspur, Contra Costa goldfields, Vernal pool fairly shrimp, etc. As described above, the location of the RDP has not been determined; construction and operation of a desalination plant (including a surface water intake and discharge of brine) may affect special-status fisheries or other plant and wildlife species associated with wetlands habitat. The South Bay Desalination plants would be located in disturbed areas (e.g., power plant, WQCP), and effects to special-status species are unlikely. Where facilities are not known (e.g., East Bay Saline Groundwater Desalination plant, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to special- status species could occur if facilities are located within or adjacent to habitat for these species. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Special-Status Species (After Mitigation): No Effect.** For LVE, the mitigation strategy identified for Terrestrial Resources, above, would also apply to impacts on special-status species. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operation. Mitigation opportunities for effects to special-status species would be avoidance of sensitive habitats to the extent possible, or acquisition of regulatory permits and implementation of regulatory permit conditions if impacts occur. In addition, general mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., construction during non-nesting or -breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** All facilities would consume energy. Pollutant emissions would be associated with energy production. Due to the size and energy requirement of the RDP, it would result in the most energy consumption. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** For ELV, further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants. The energy requirement for the RDP could be reduced with implementation of energy recovery devices. Participating agencies could enroll in voluntary PAGE Demand Response Programs to reduce demand on the electrical system during peak consumption periods. However, the total amount of energy consumed and pollutants emitted would still be considered an increase.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water Bromide with Concept Bromide

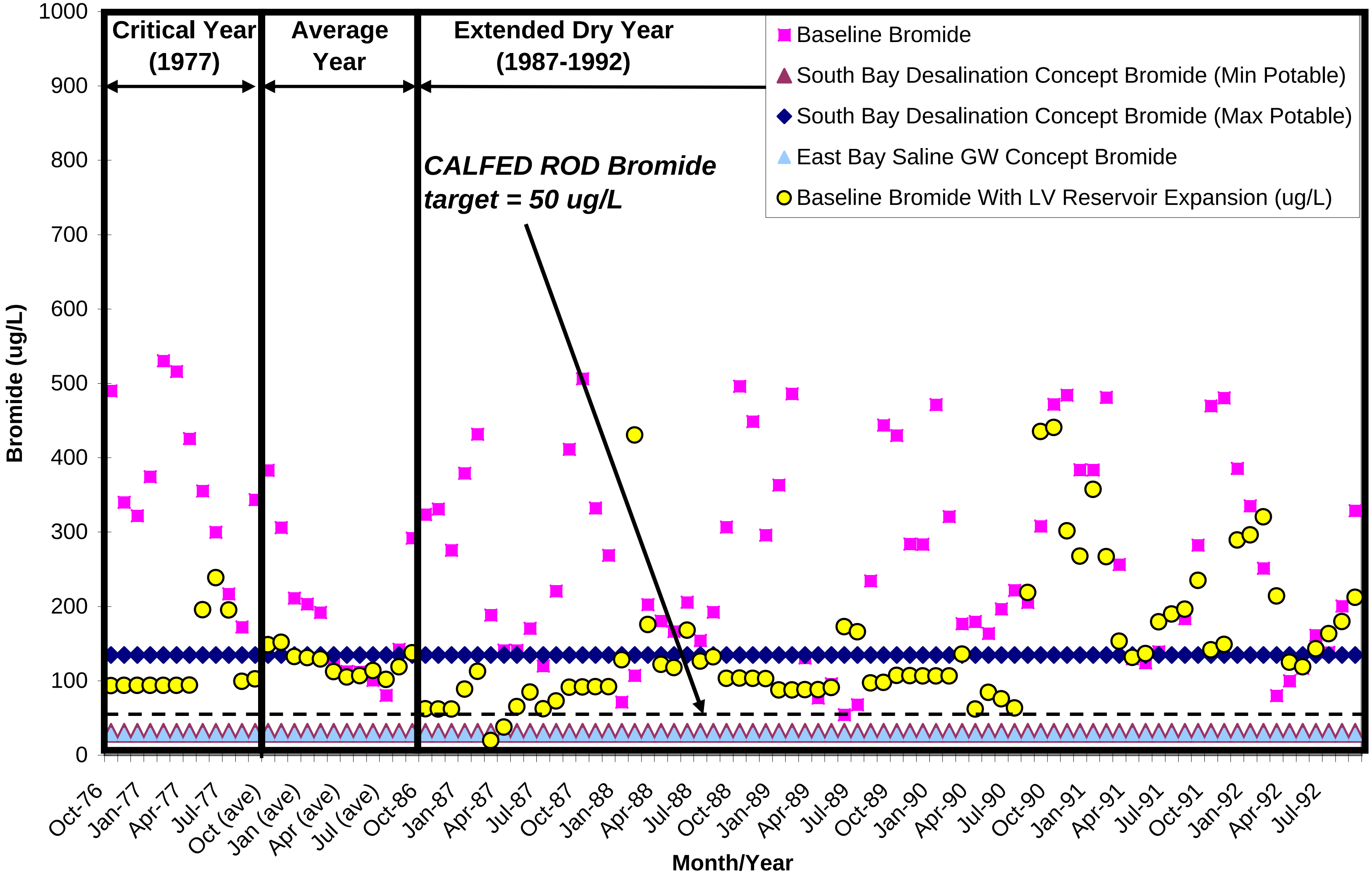


Note: East Bay Desal Bromide reflects bromide in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline bromide with Los Vaqueros Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water Bromide with Concept Bromide

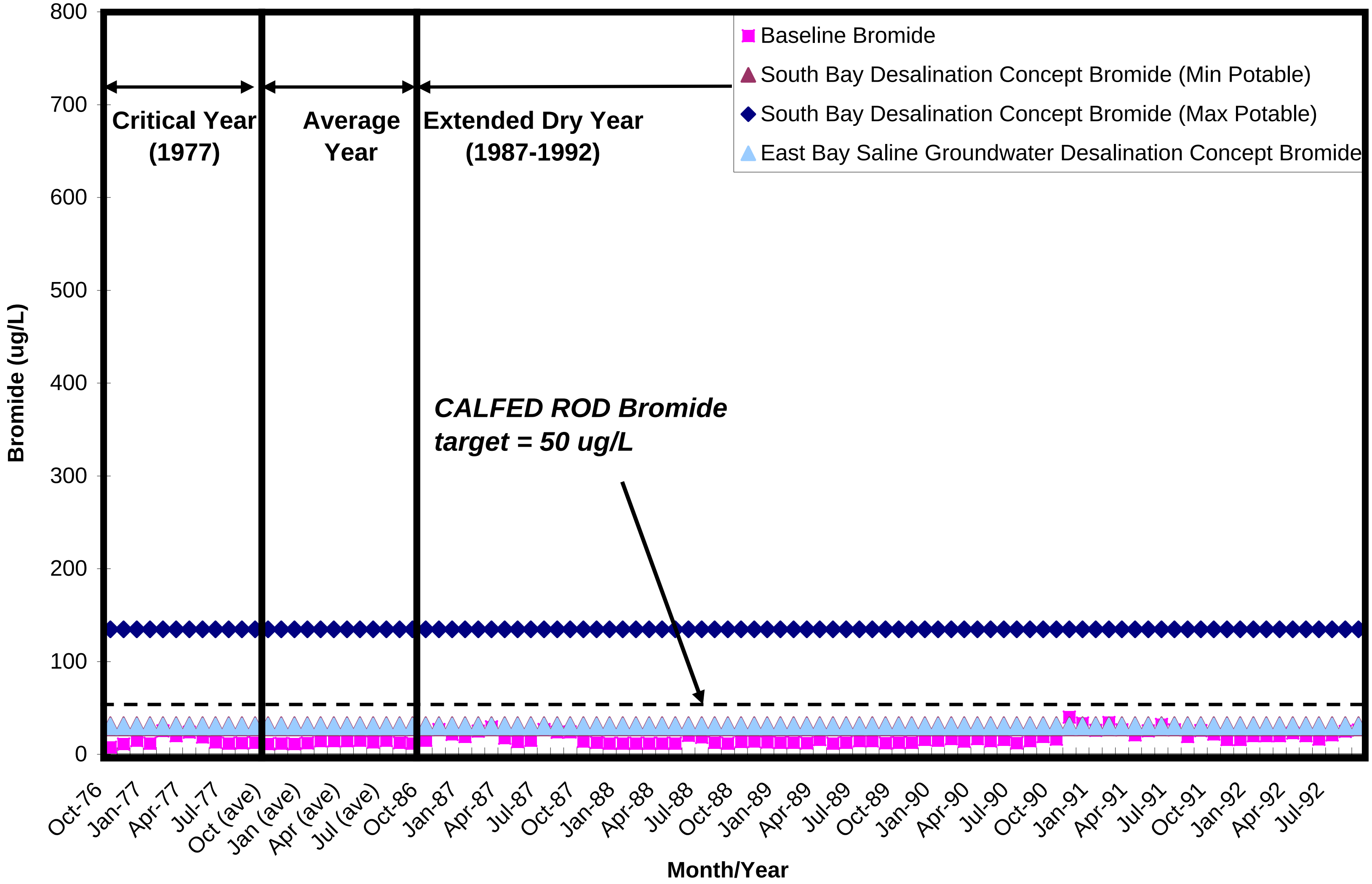


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline bromide with Los Vaqueros Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water Bromide with Concept Bromide

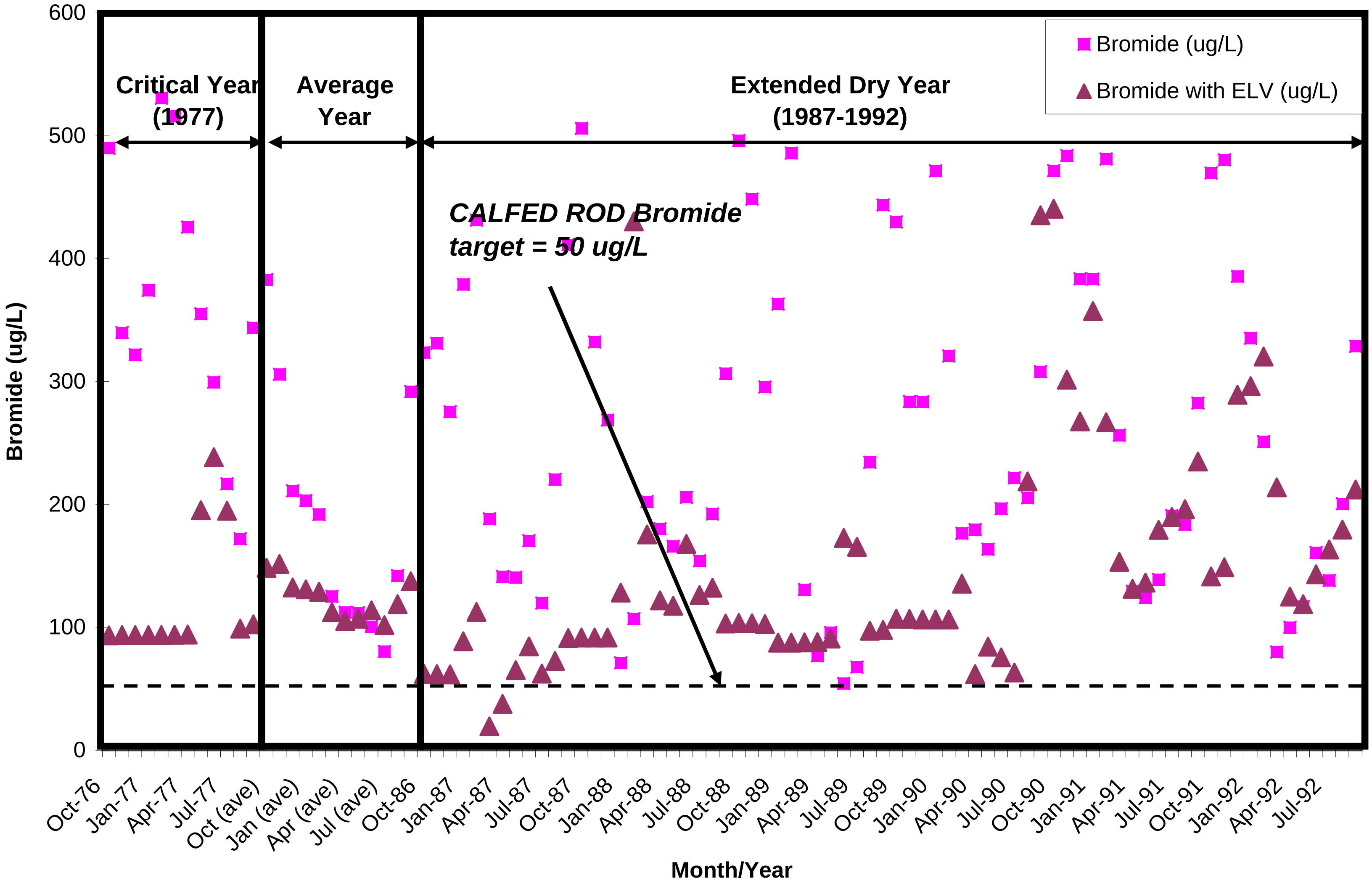


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline Bromide with Concept Bromide

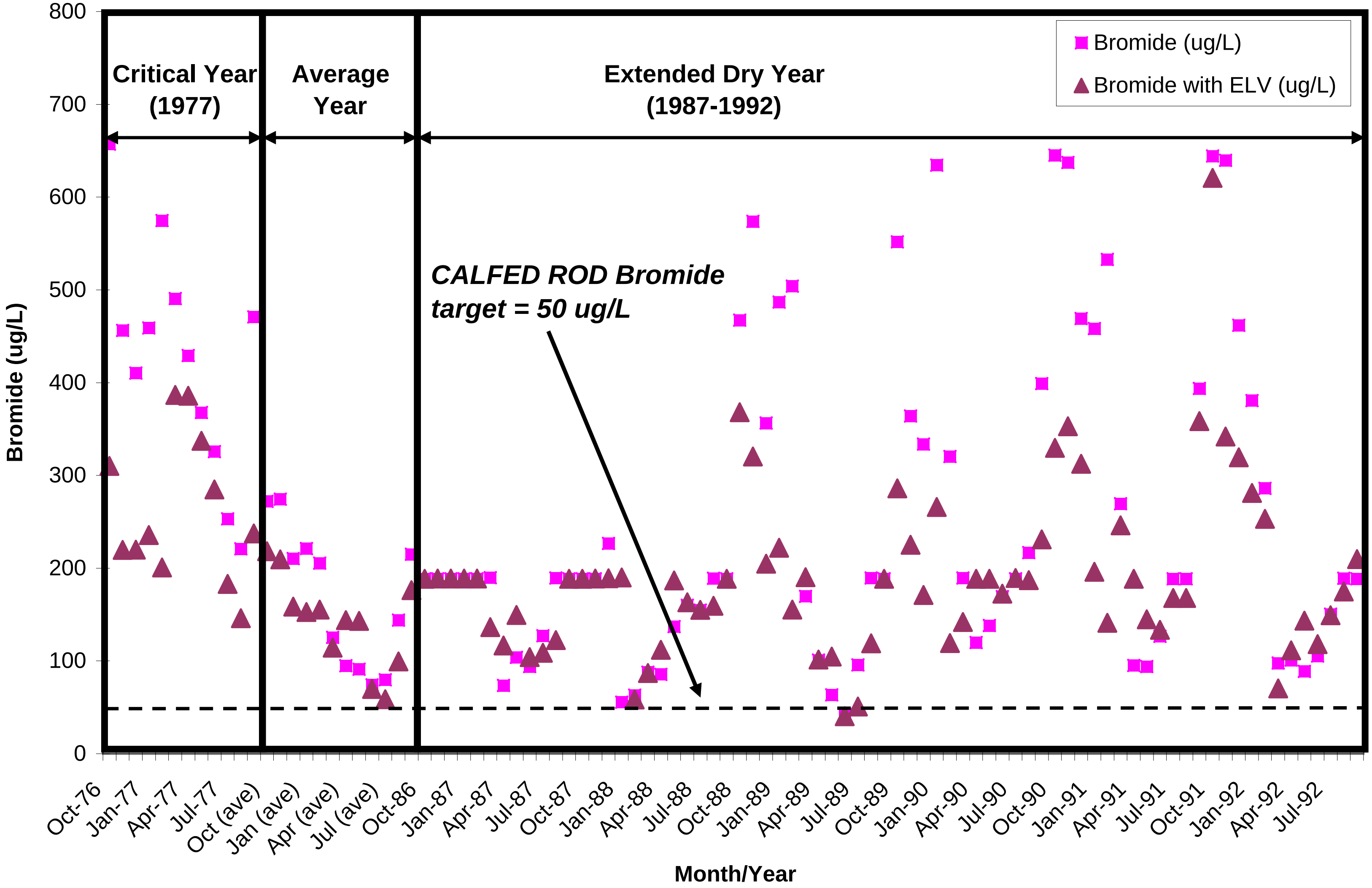


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline Bromide with Concept Bromide

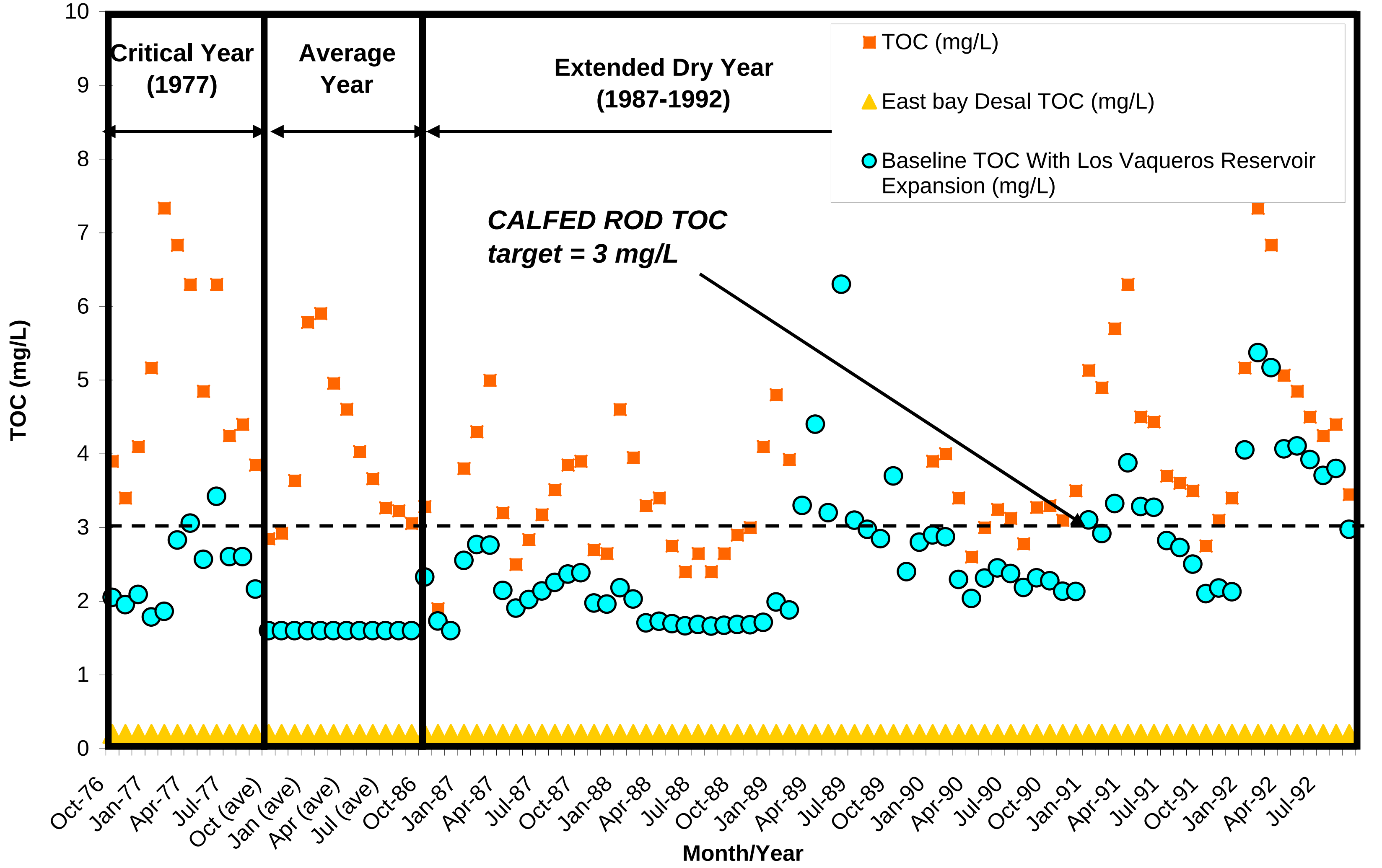


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TOC with Concept TOC

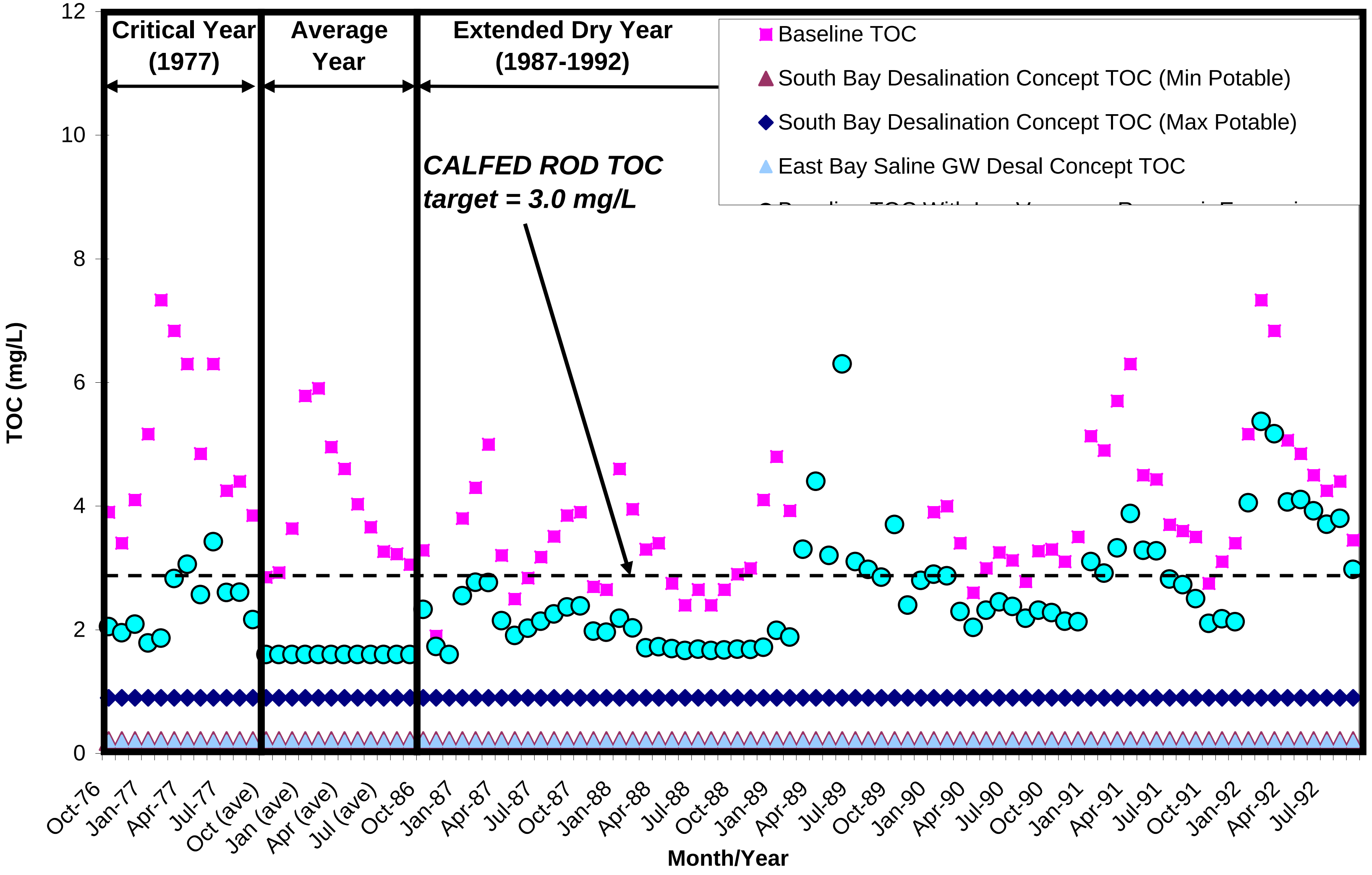


Note: East Bay Desal TOC reflects TOC in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline TOC with Los Vaqueros Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TOC with Concept TOC

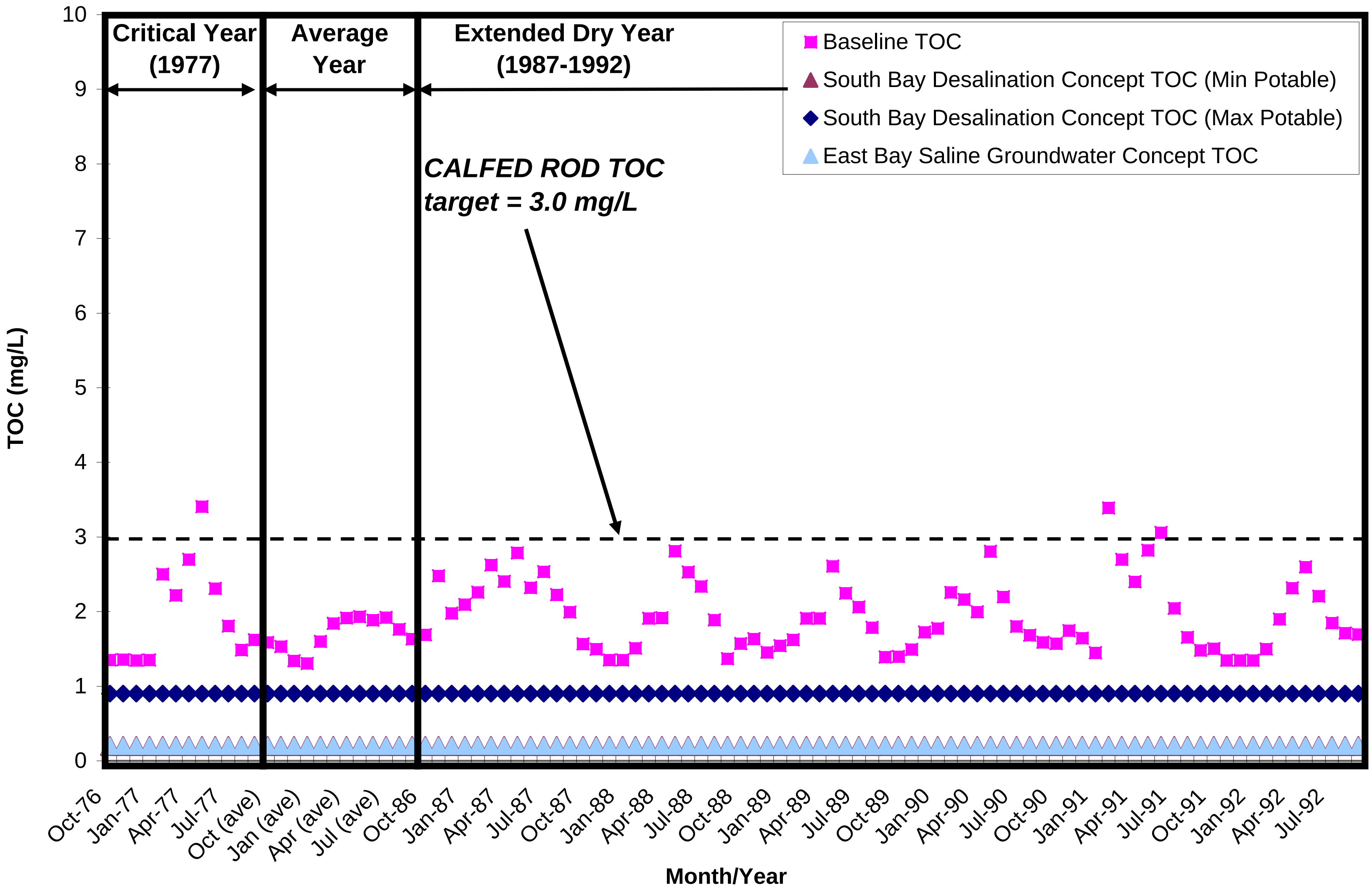


Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TOC with Los Vaqueros Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TOC with Concept TOC

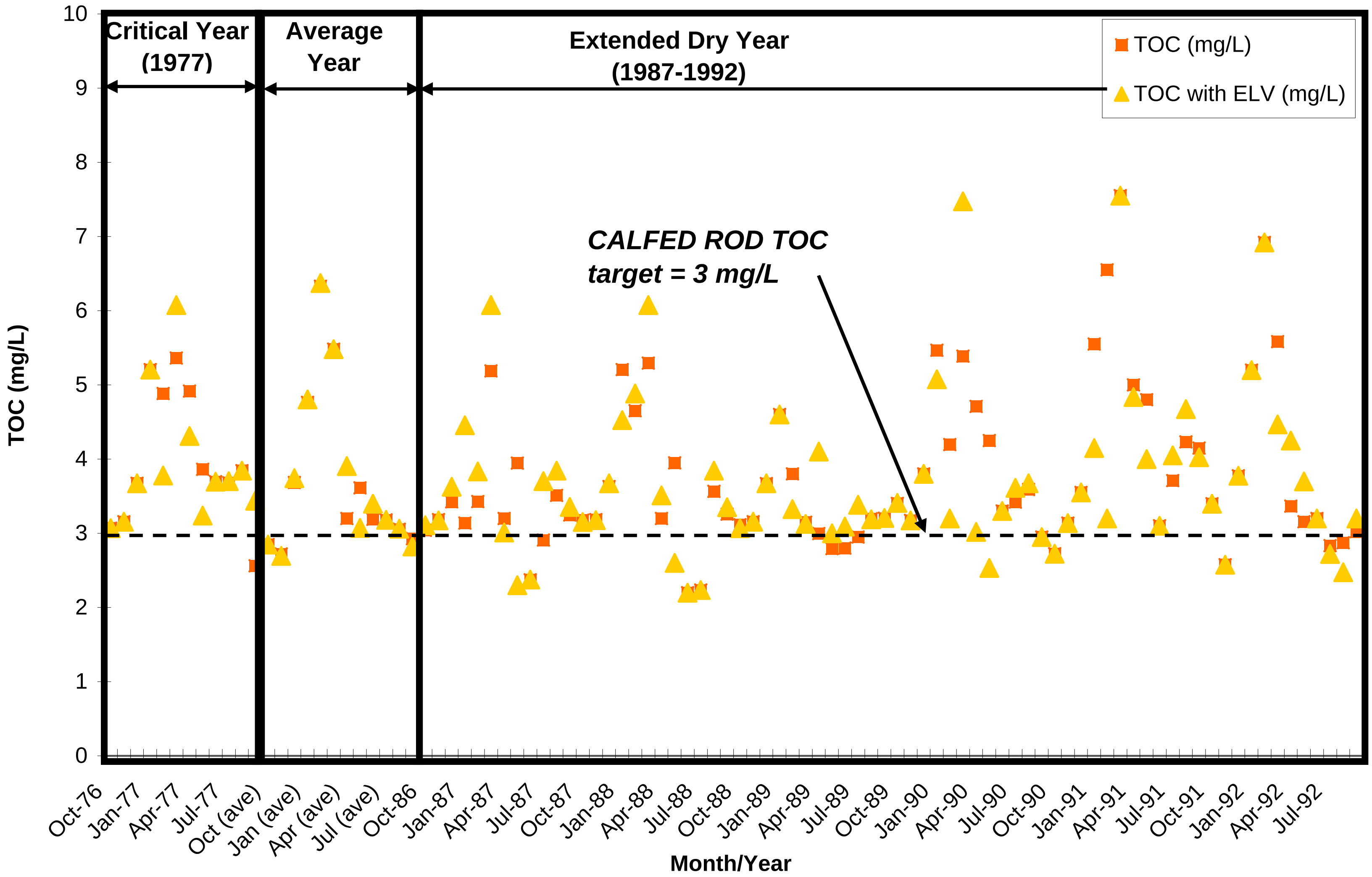


Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline TOC with Concept TOC

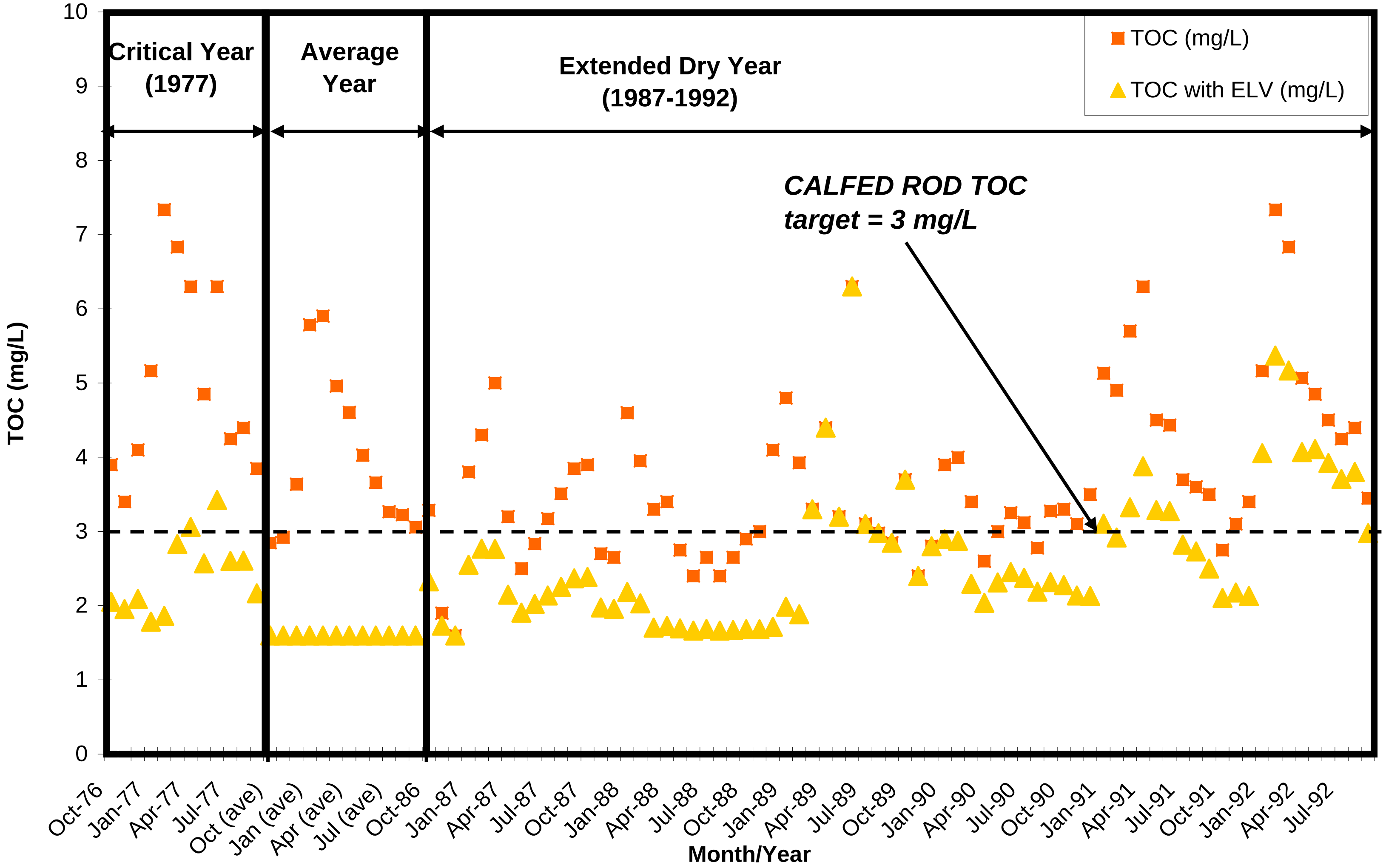


Note: ELV water quality is the flow-weighted mixture of Rock Slough, Old River and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline TOC with Concept TOC

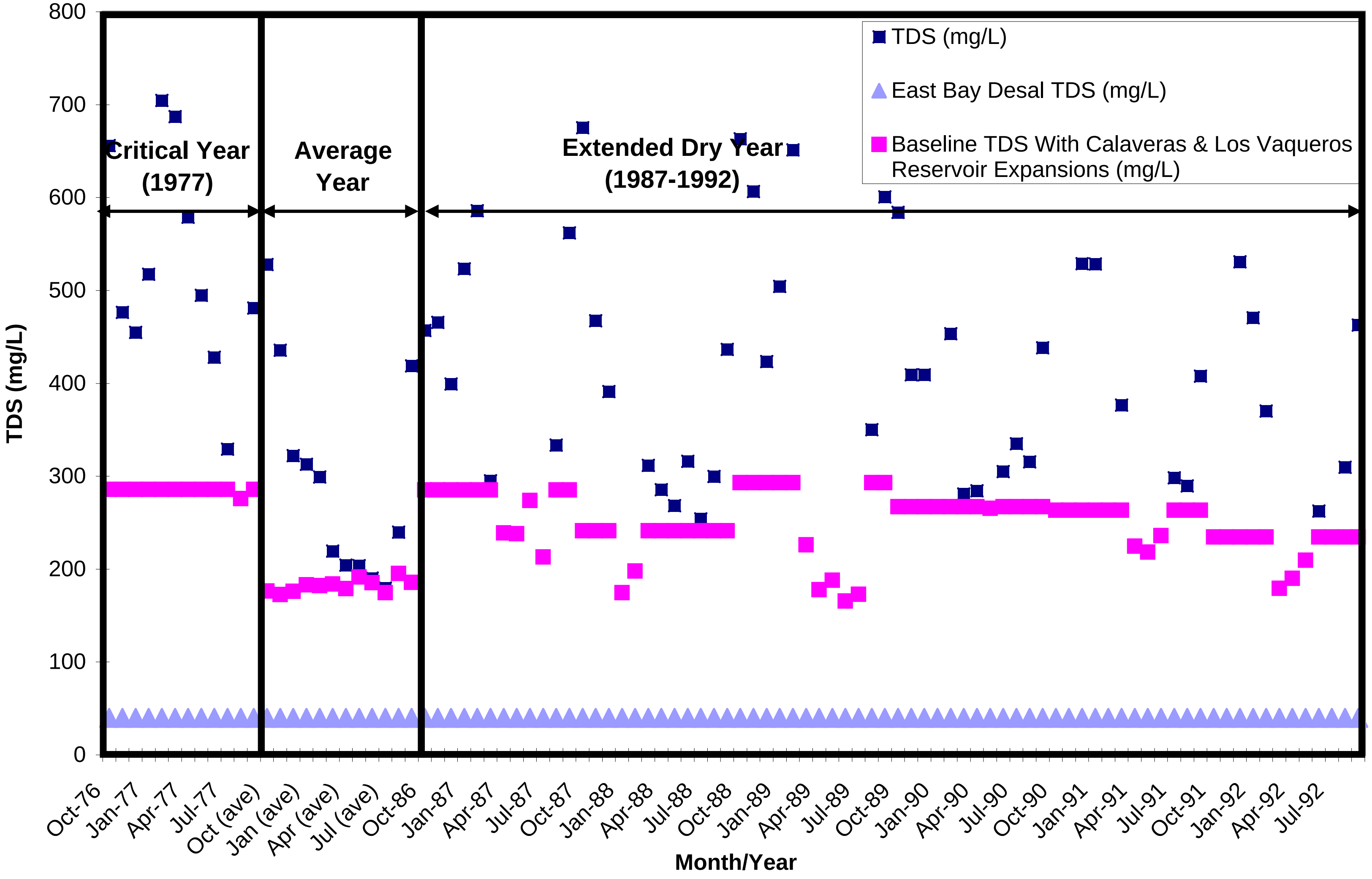


Note: ELV water quality is the flow-weighted mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir TOC based on diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TDS with Concept TDS

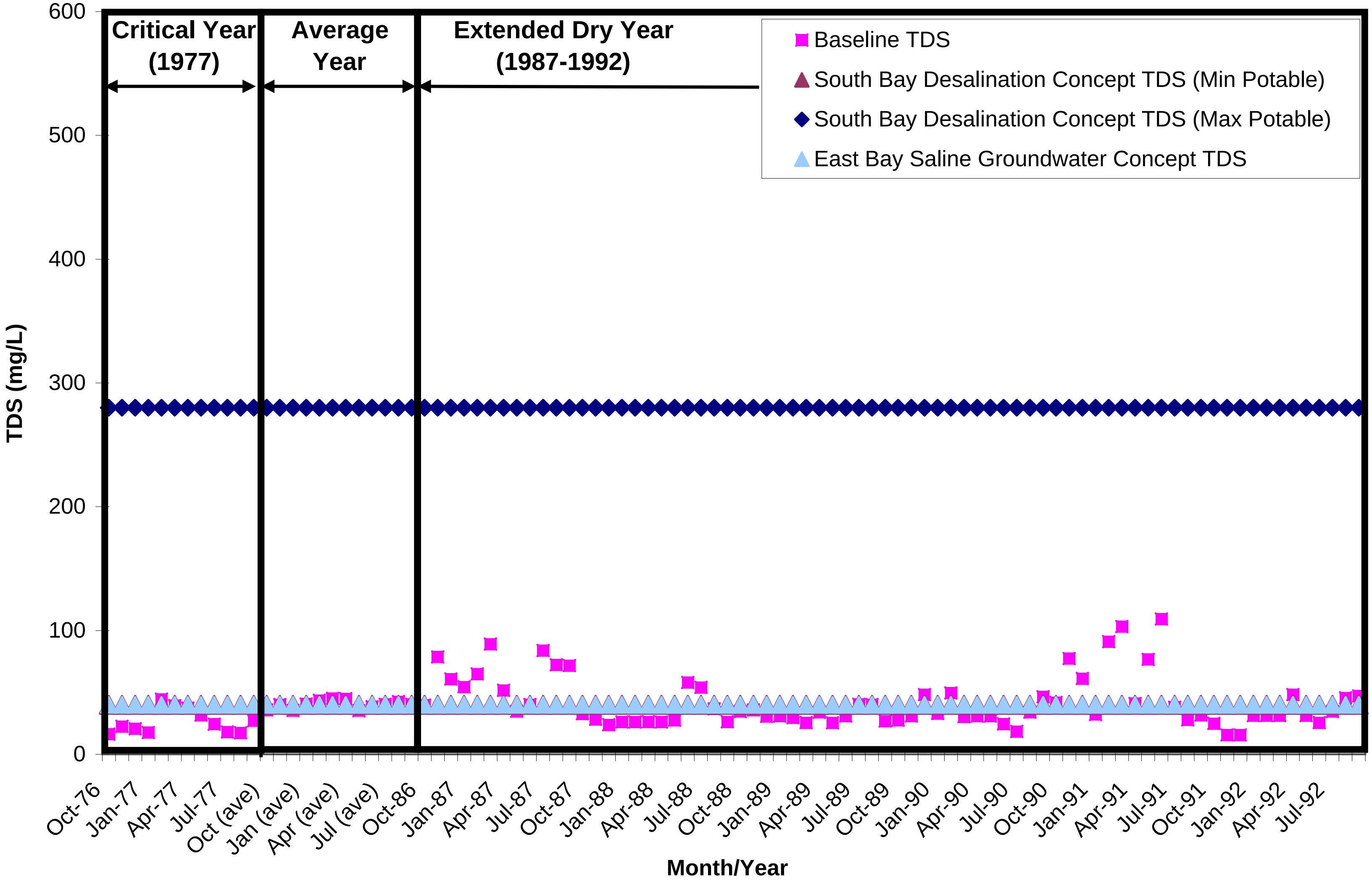


Note: East Bay Desal TDS reflects TDS in pure desalinated supply. This would be blended with ACWD supplies in the distribution system. The baseline TDS with Los Vaqueros Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TDS with Concept TDS

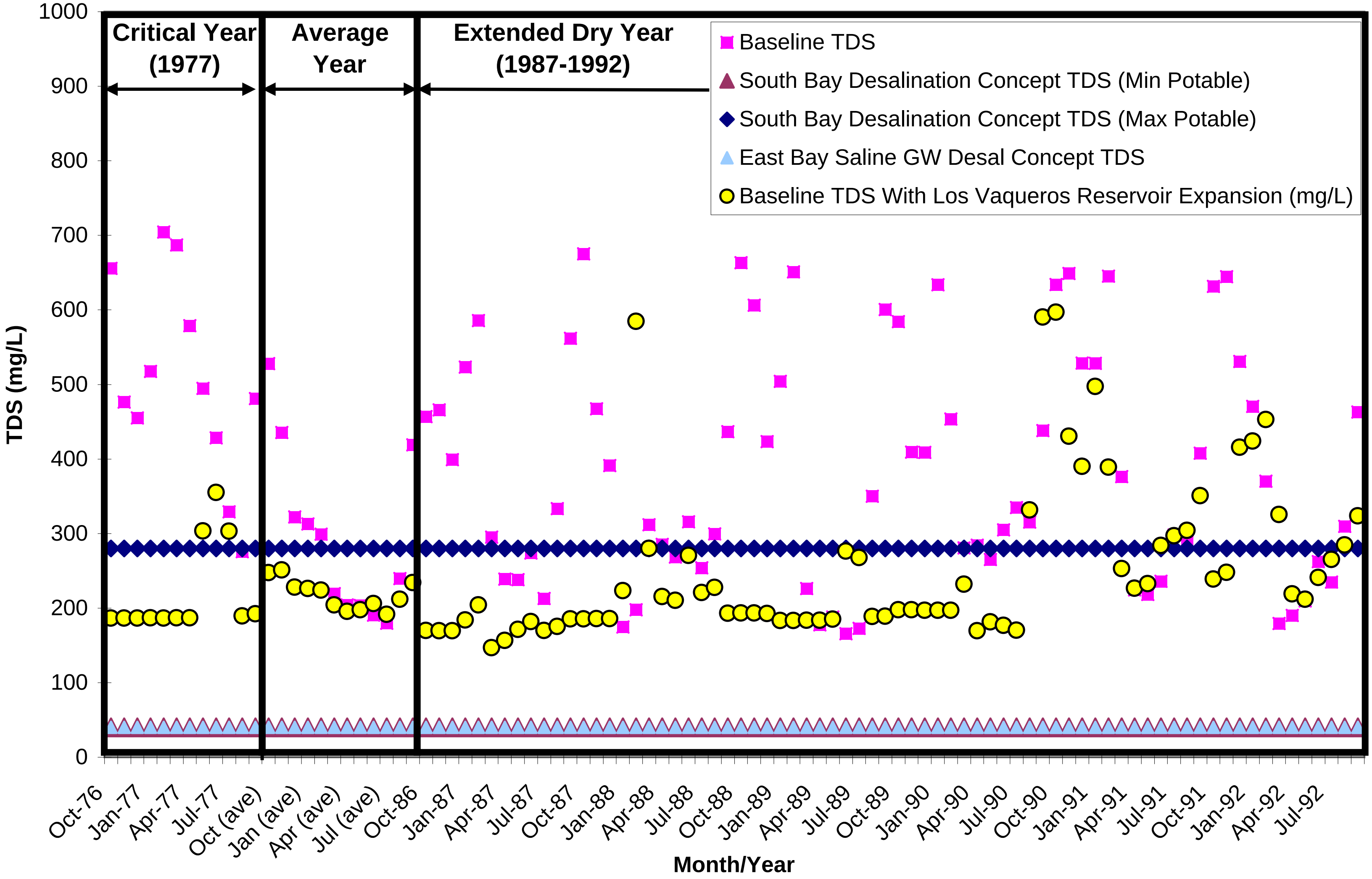


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TDS with Concept TDS

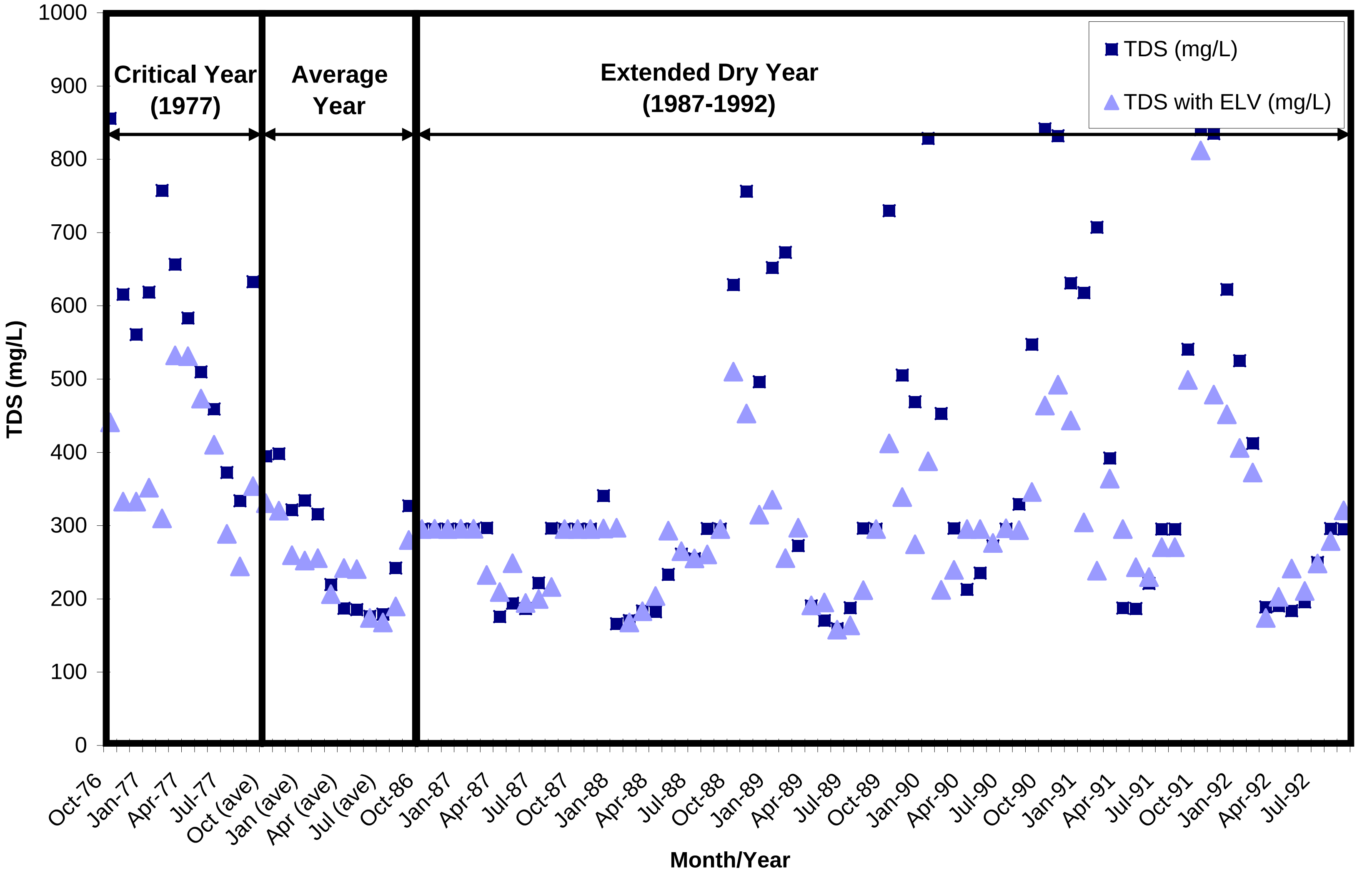


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TDS with Los Vaqueros Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline TDS with Concept TDS

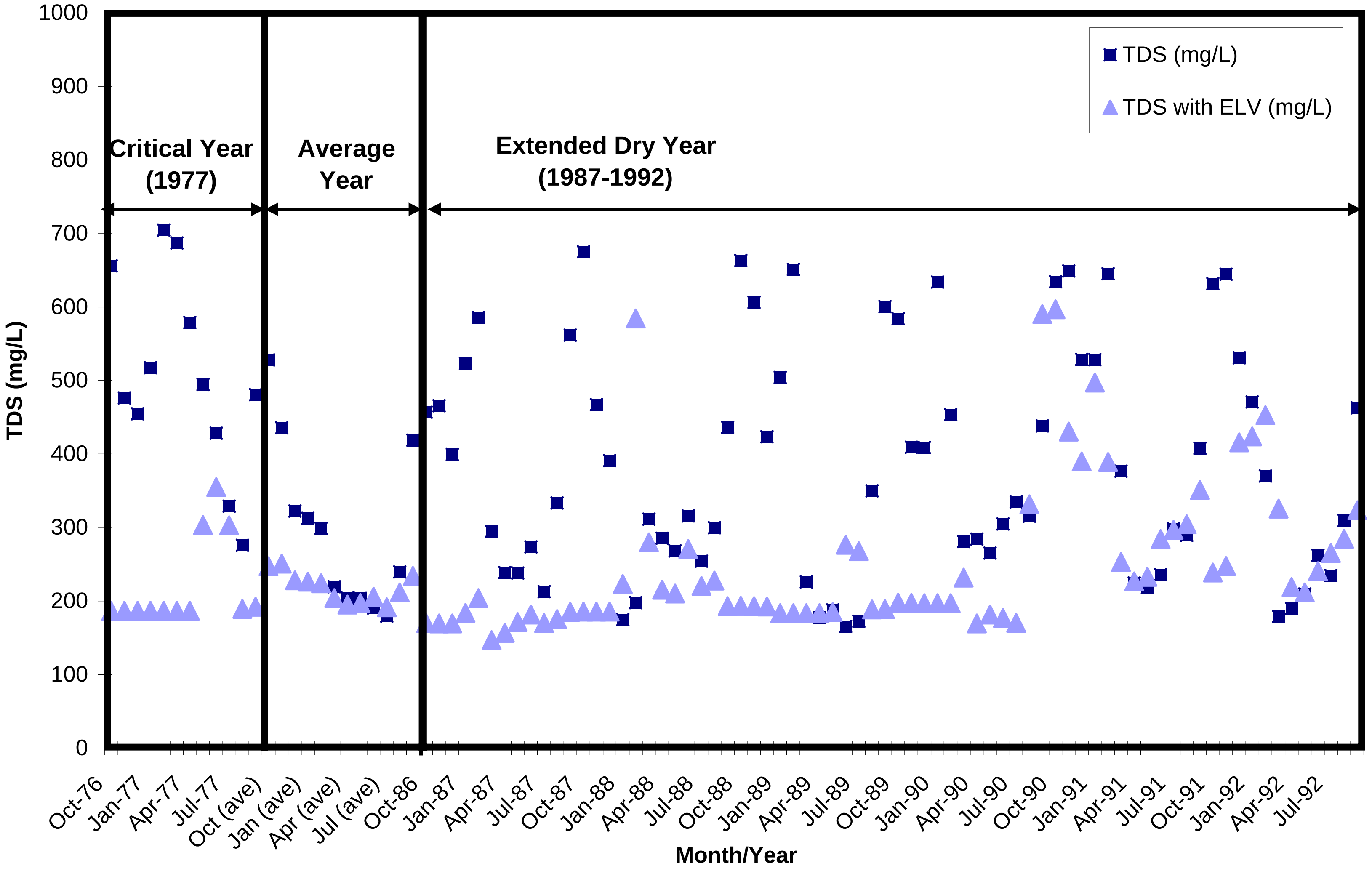


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline TDS with Concept TDS

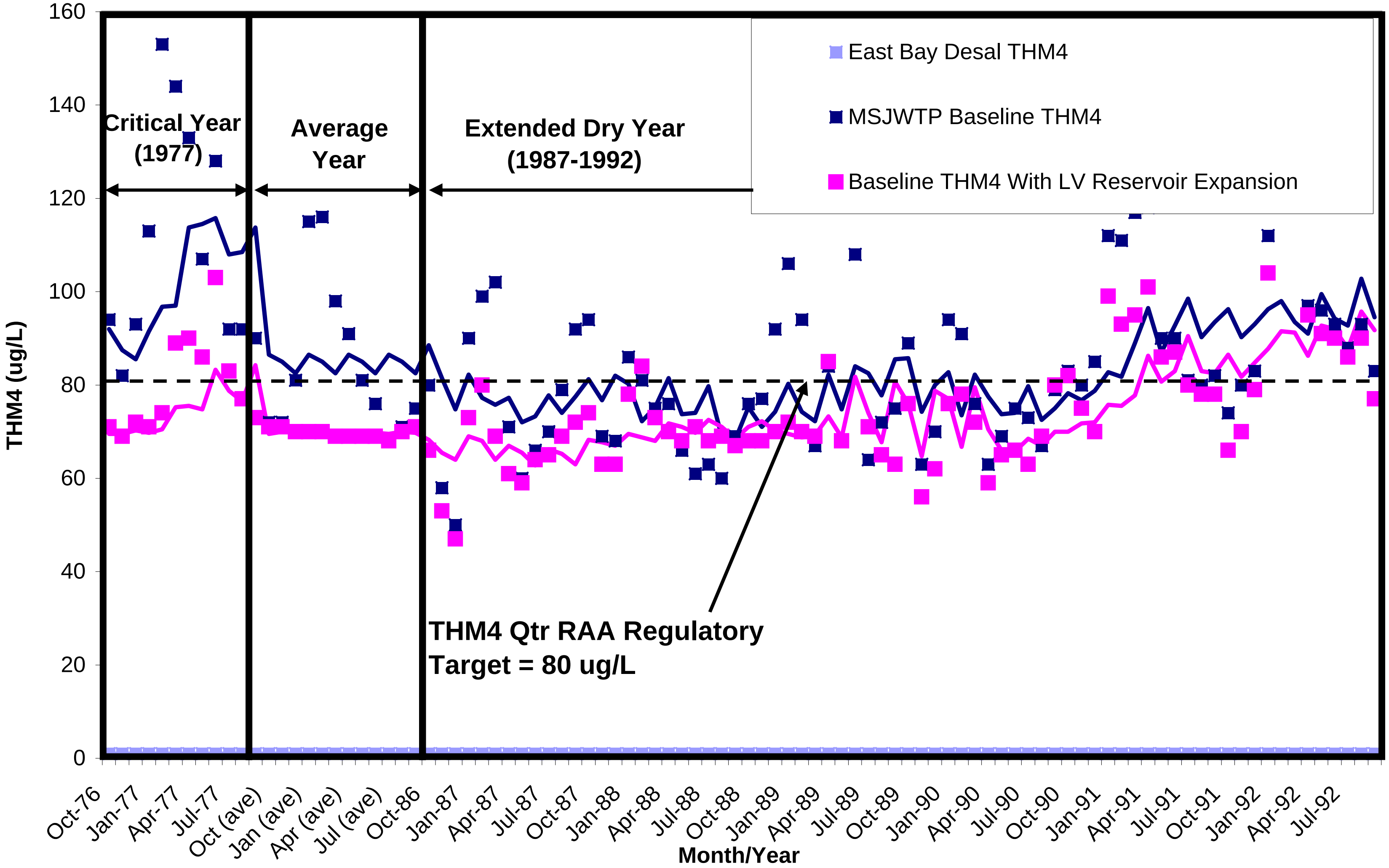


Note: ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (MSJWTP)

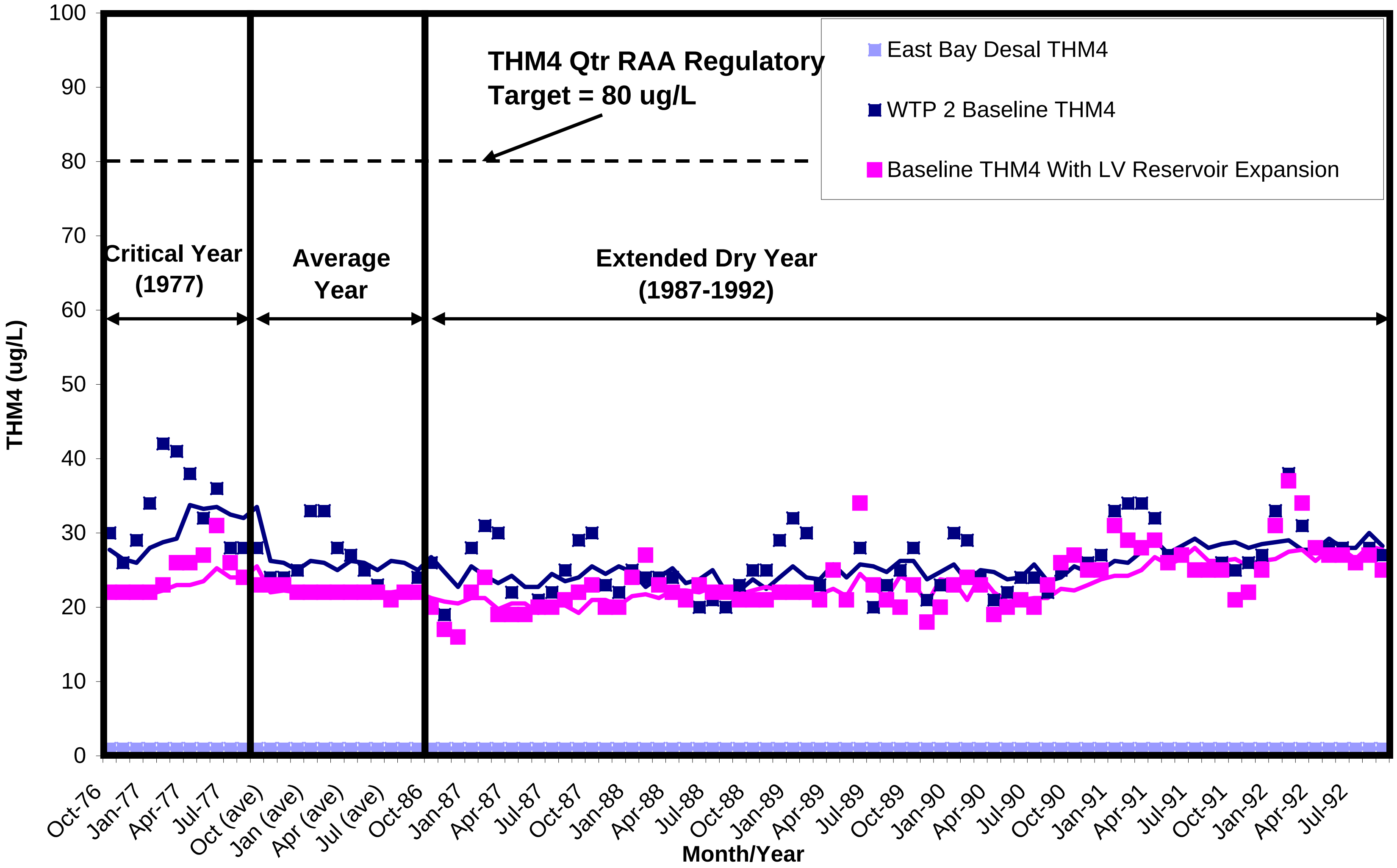


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline THM4 with Los Vaqueros Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for MSJWTP.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (WTP 2)

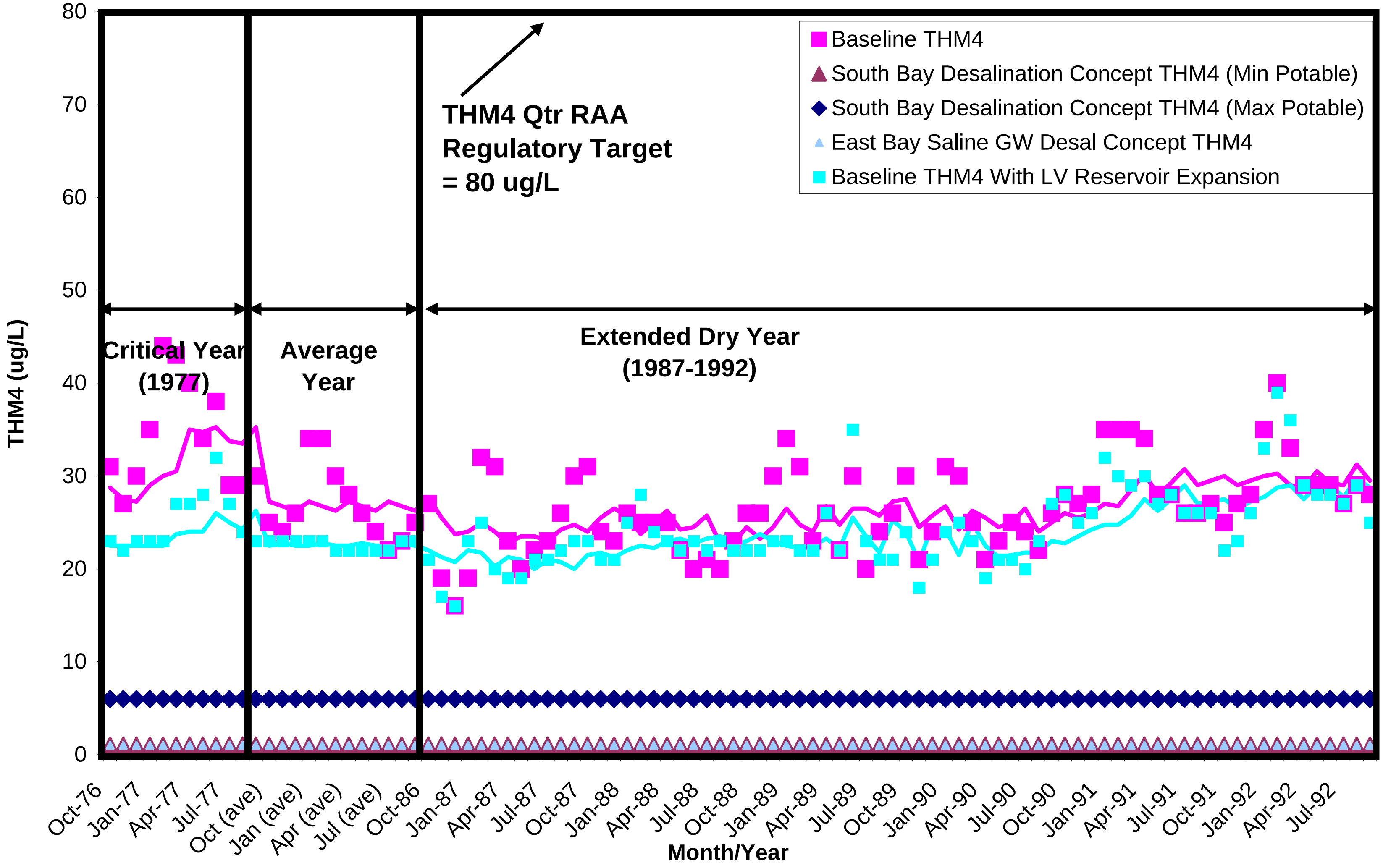


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline THM4 with Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline THM4 with Concept THM4

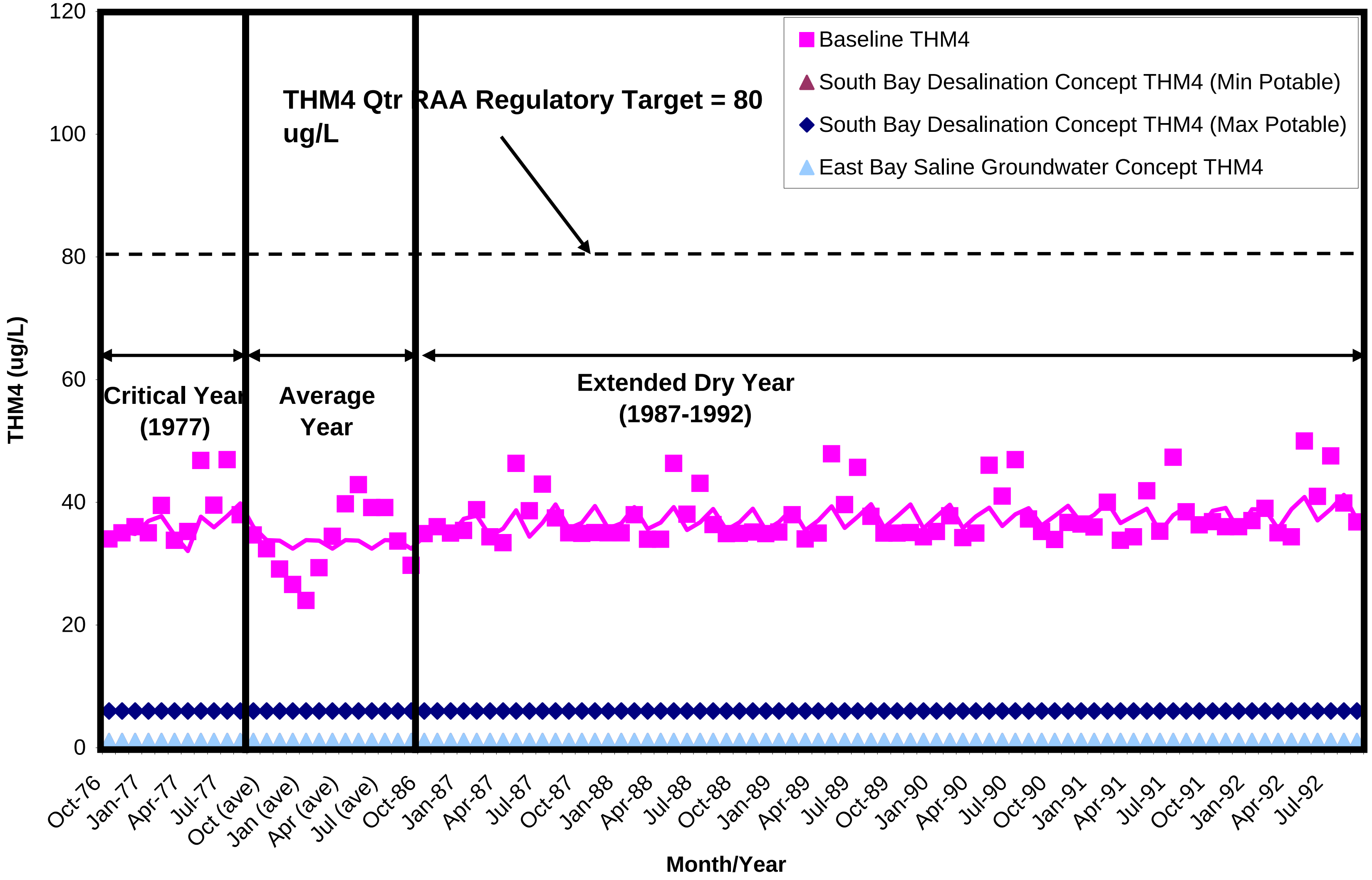


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline THM4 with Los Vaqueros Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated baseline DBP production assumes settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline THM4 with Concept THM4

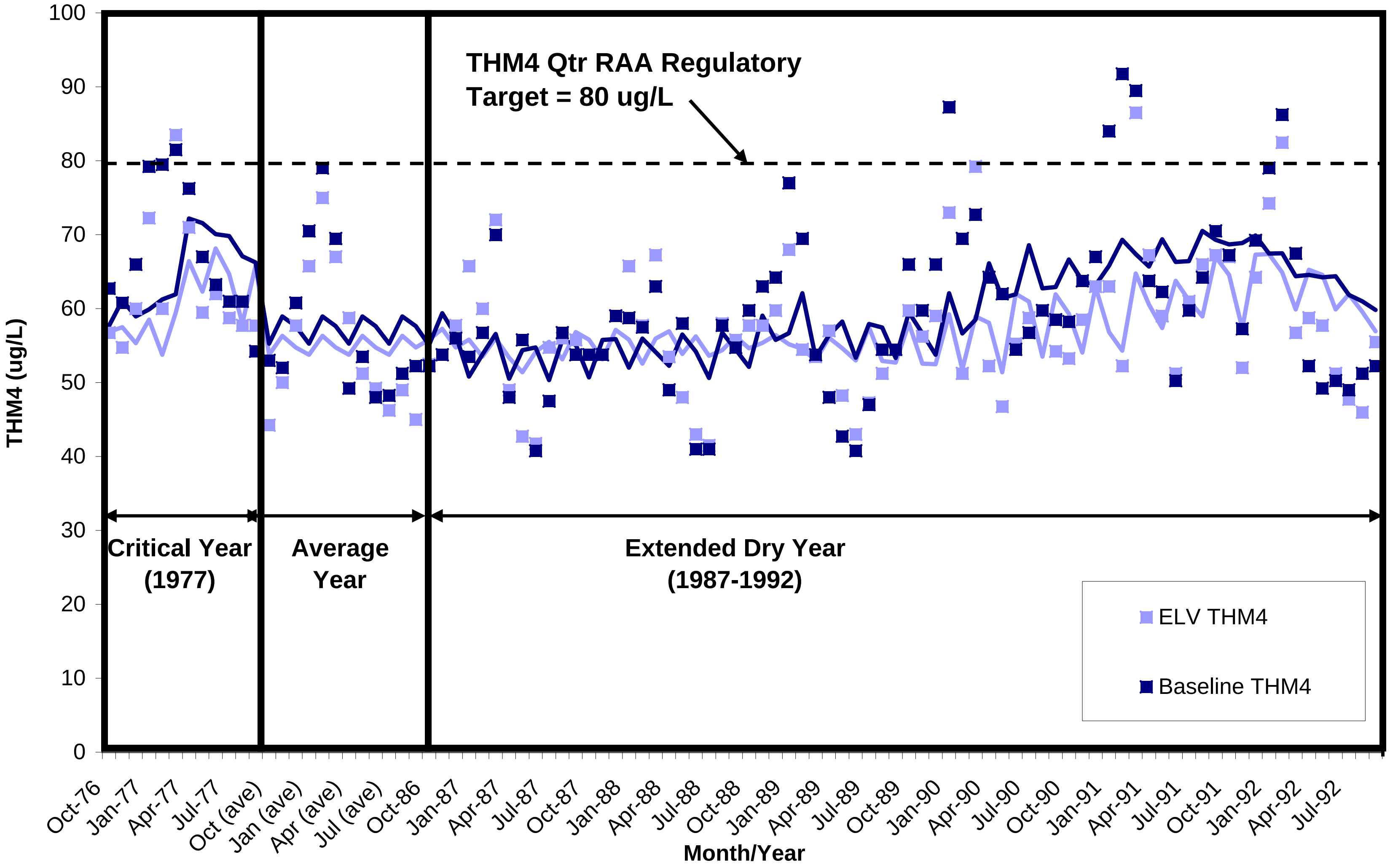


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline THM4 with Concept THM4

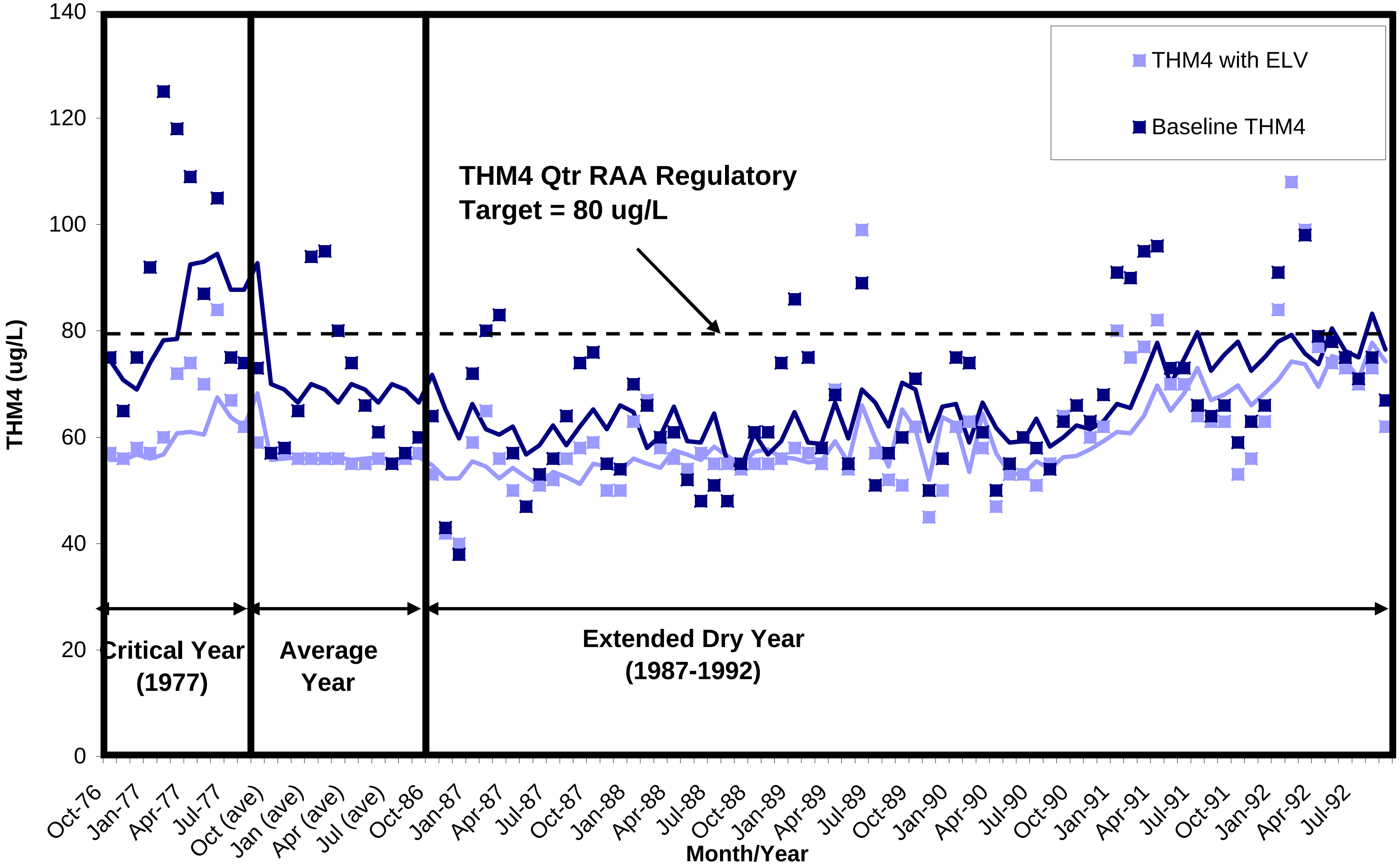


Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline THM4 with Concept THM4 (Conventional Treatment)

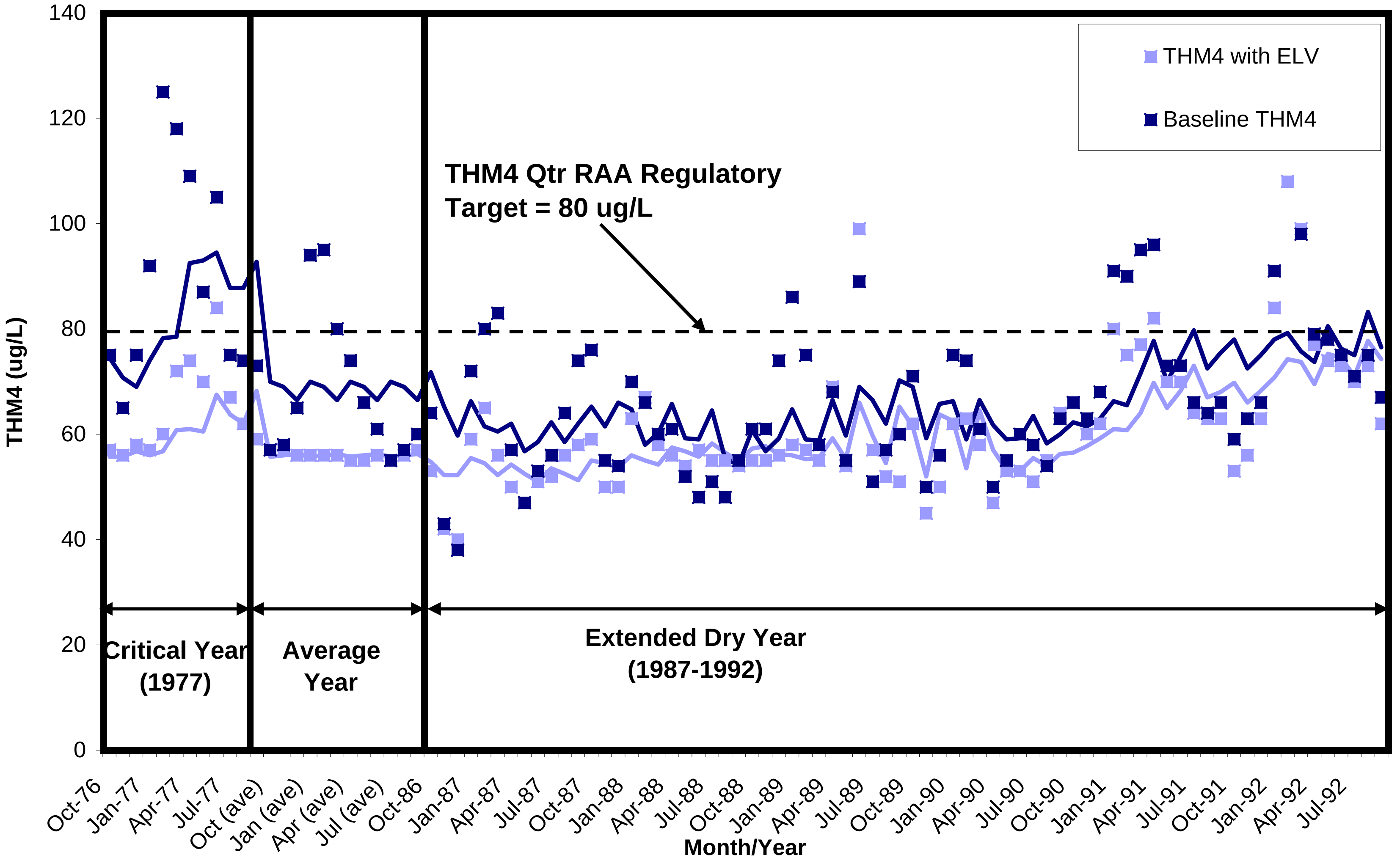


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline THM4 with Concept THM4 (UF & Conventional Treatment)

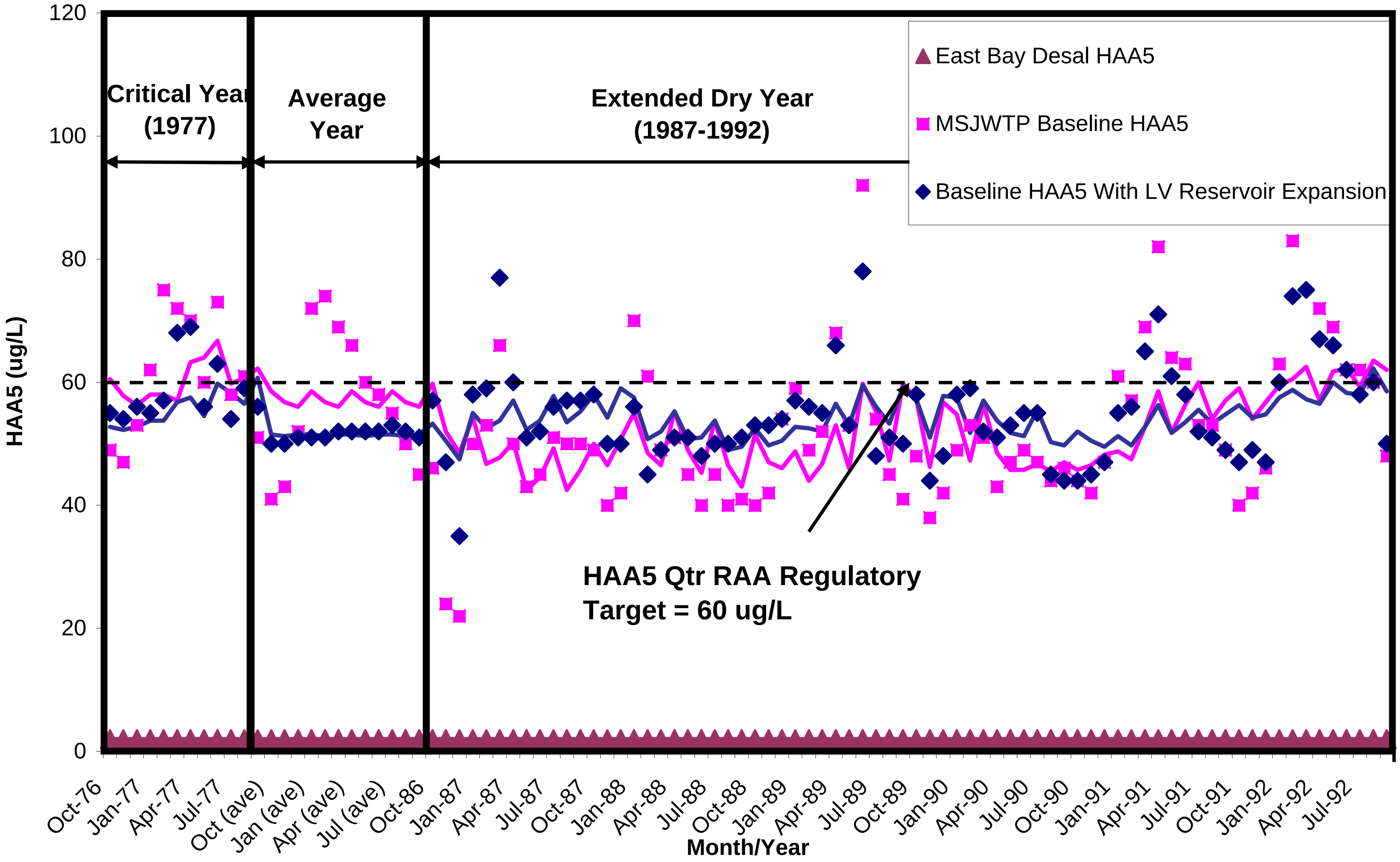


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 8:12 blend of UF:conventionally treated supplies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline HAA5 with Concept HAA5 (MSJWTP)

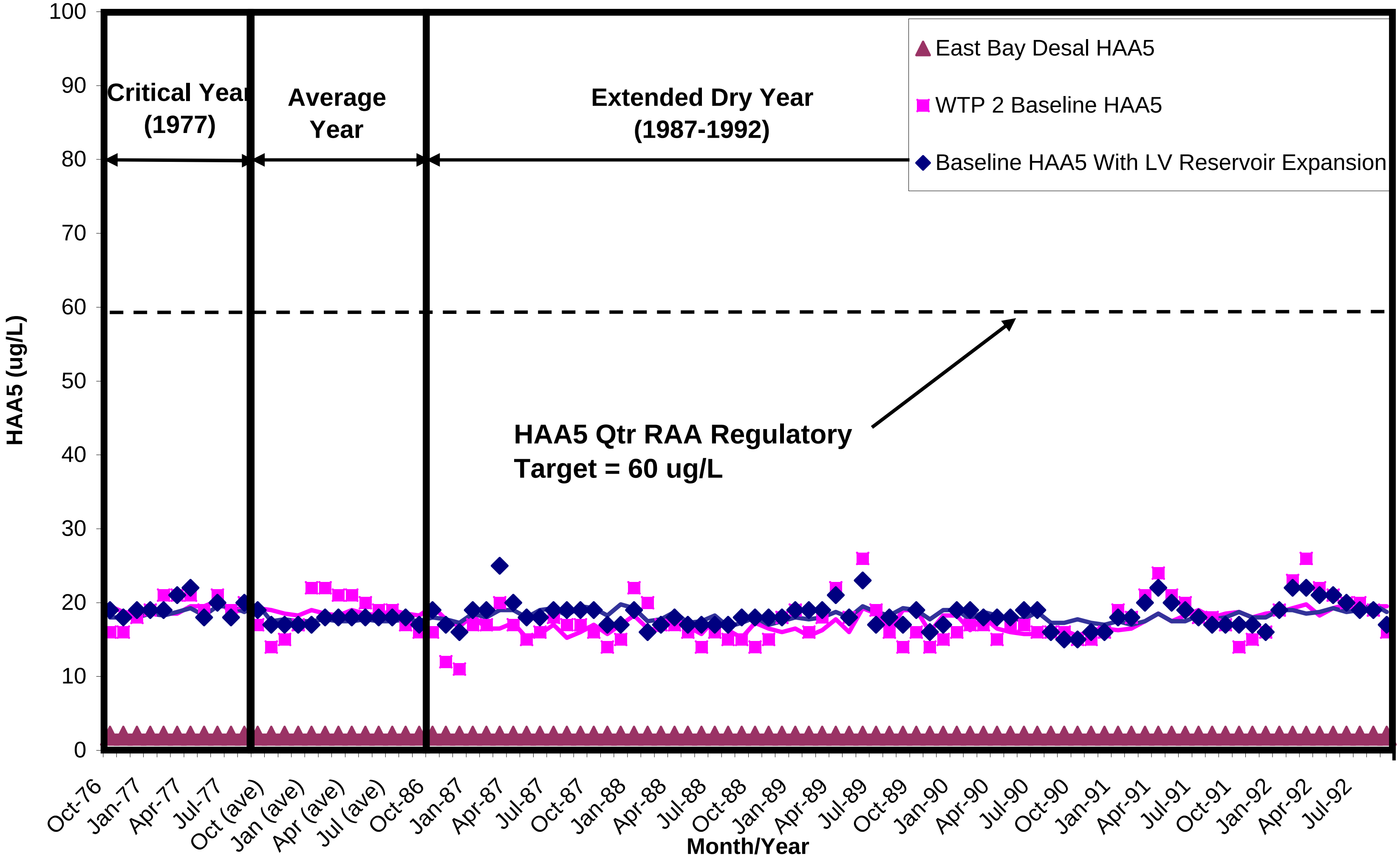


Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline HAA5 with Los Vaqueros Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for MSJWTP.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

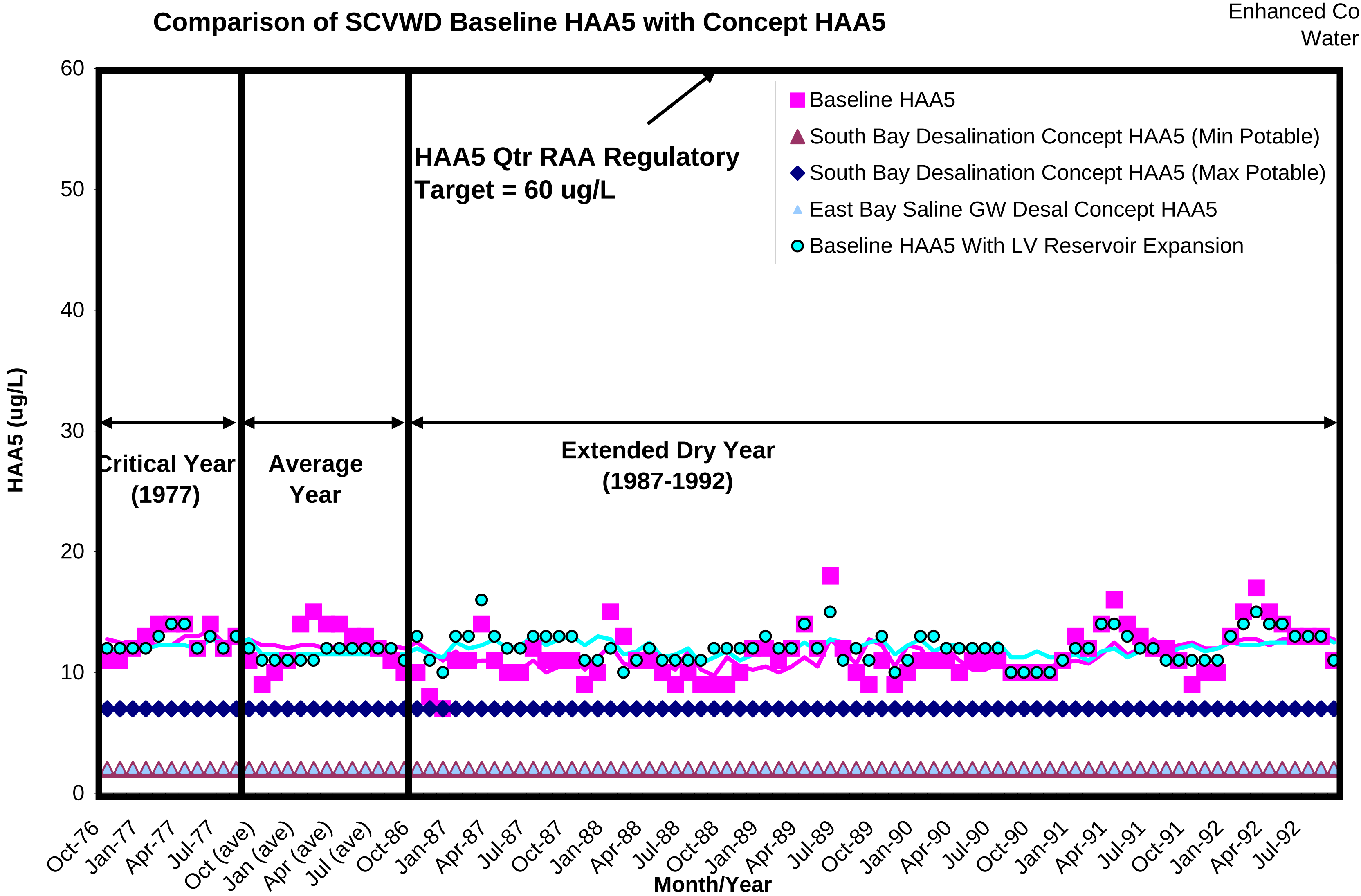
Comparison of ACWD Baseline HAA5 with Concept HAA5 (WTP 2)



Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline HAA5 with Los Vaqueros Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for WTP 2.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

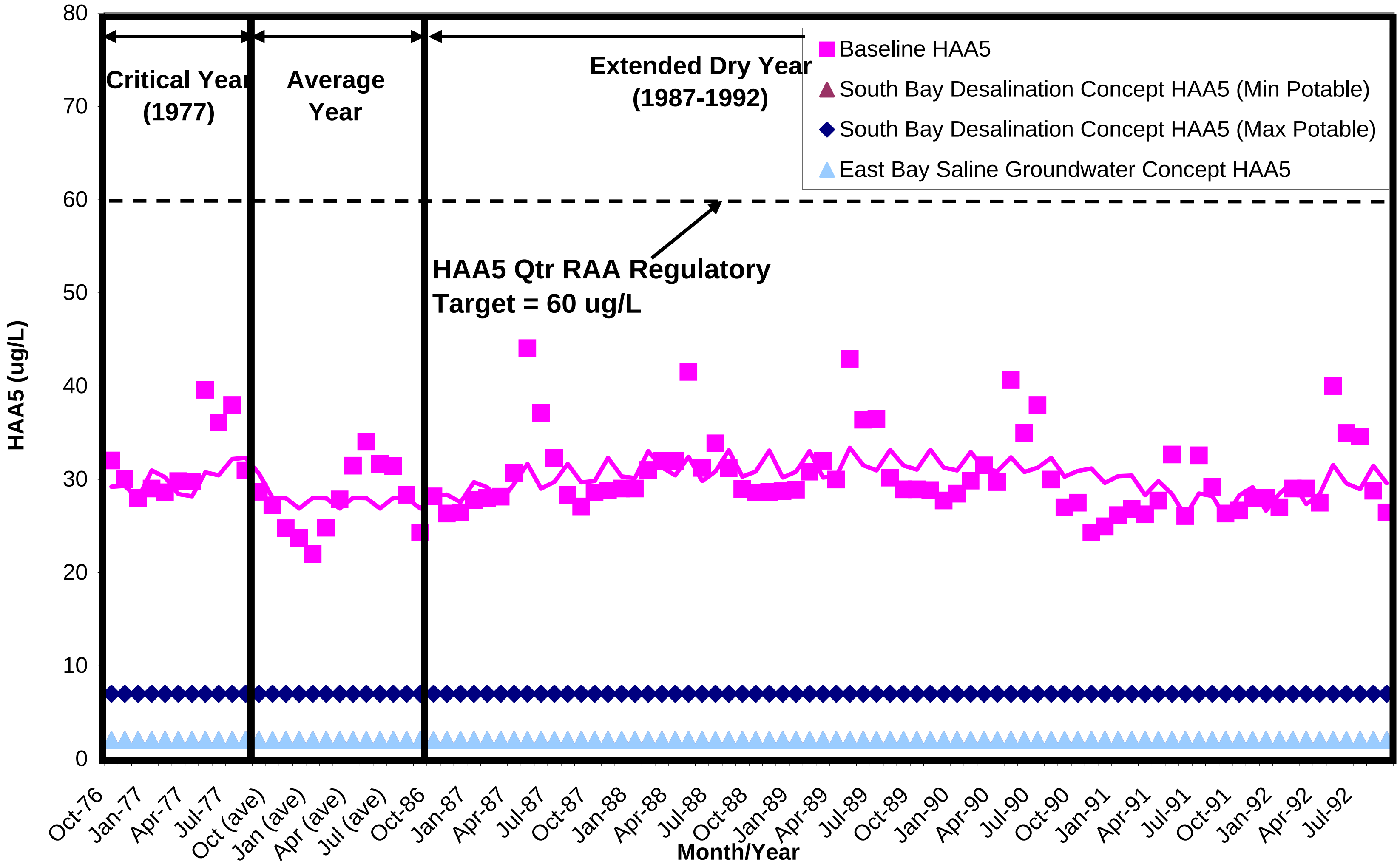


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline HAA5 with Los Vaqueros Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated baseline DBP production for settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline HAA5 with Concept HAA5

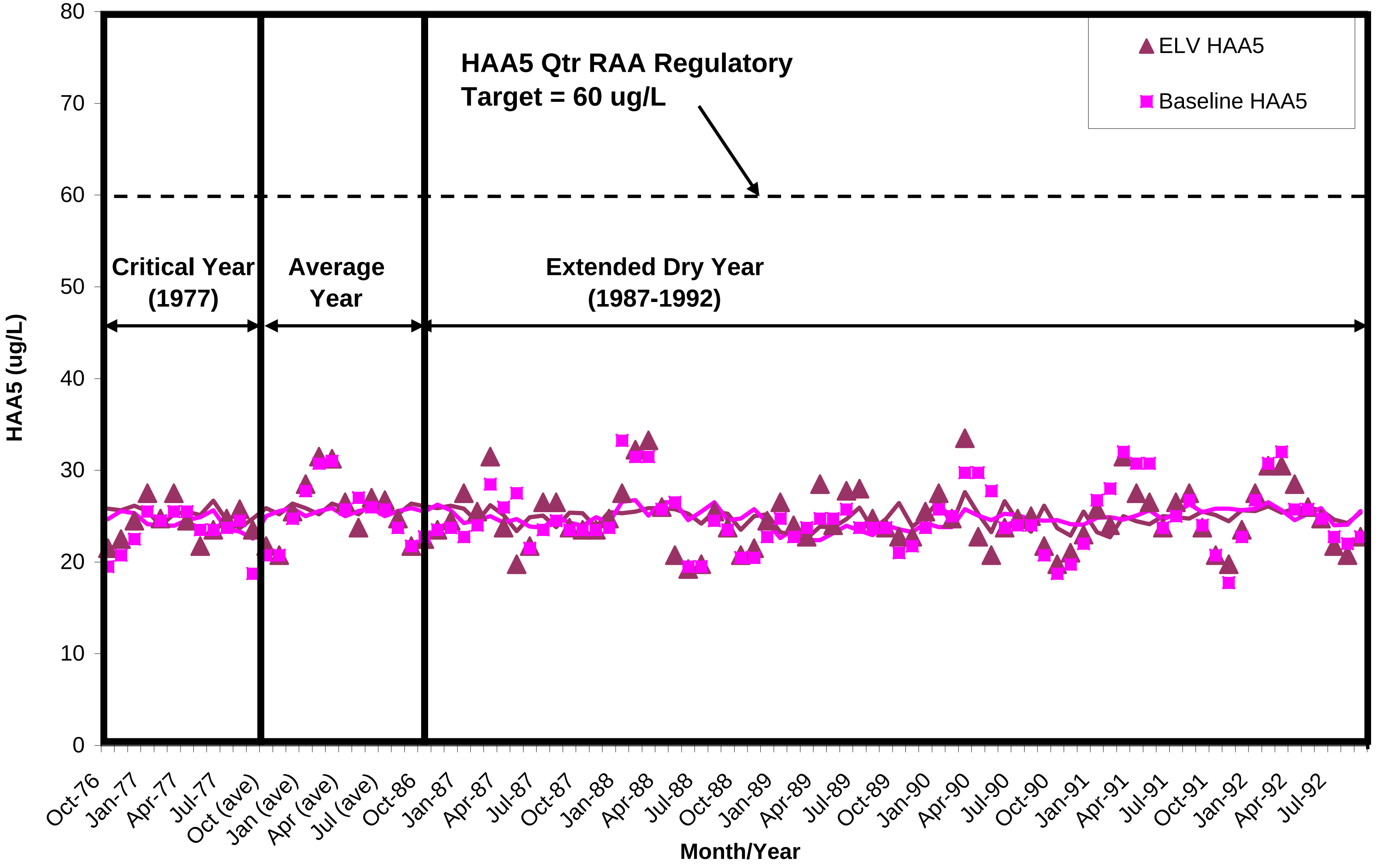


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. The baseline HAA5 with Calaveras Reservoir Expansion is the projected blended treated water quality entering the BDPLs with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline HAA5 with Concept HAA5

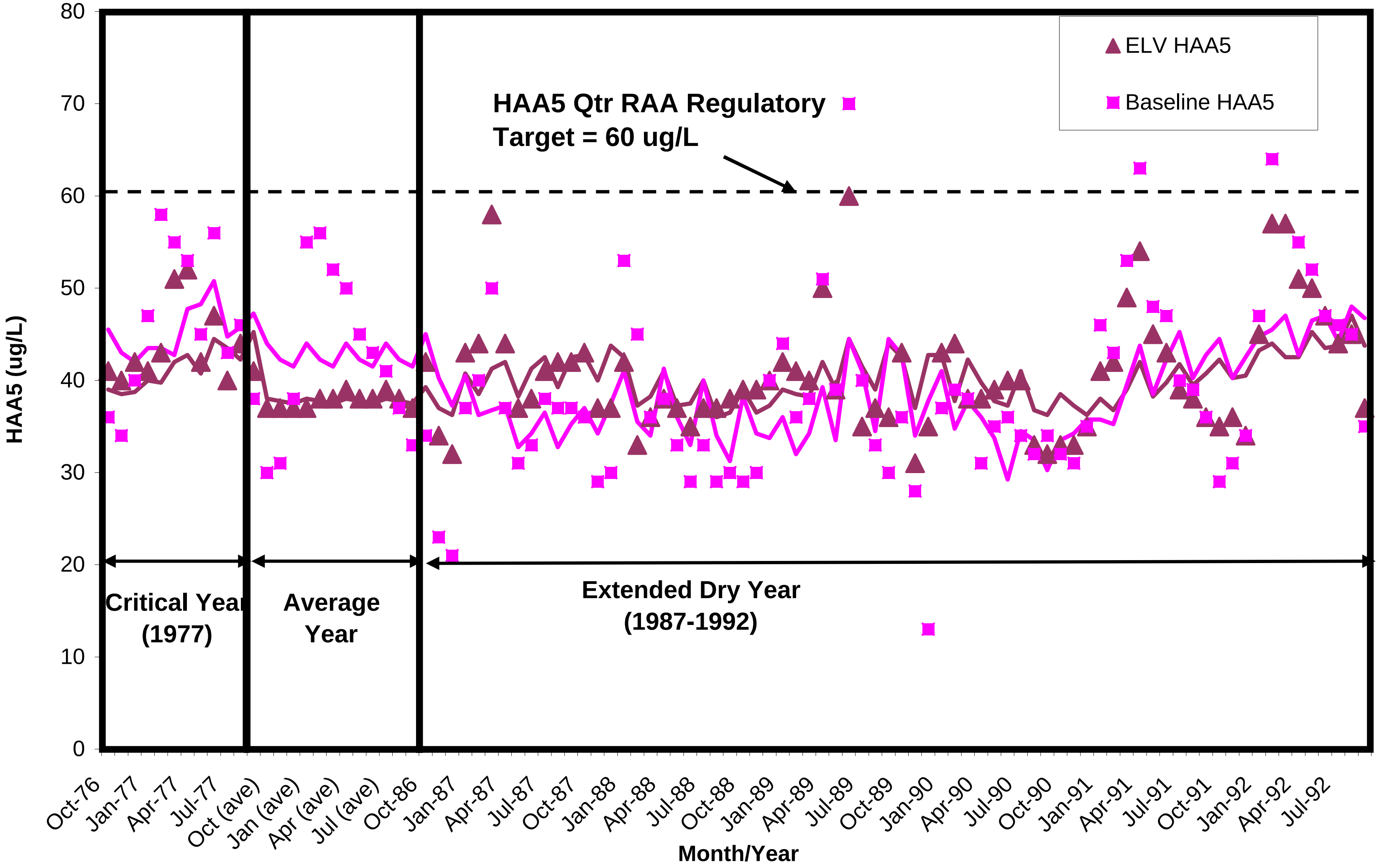


Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline HAA5 with Concept HAA5 (Conventional Treatment)

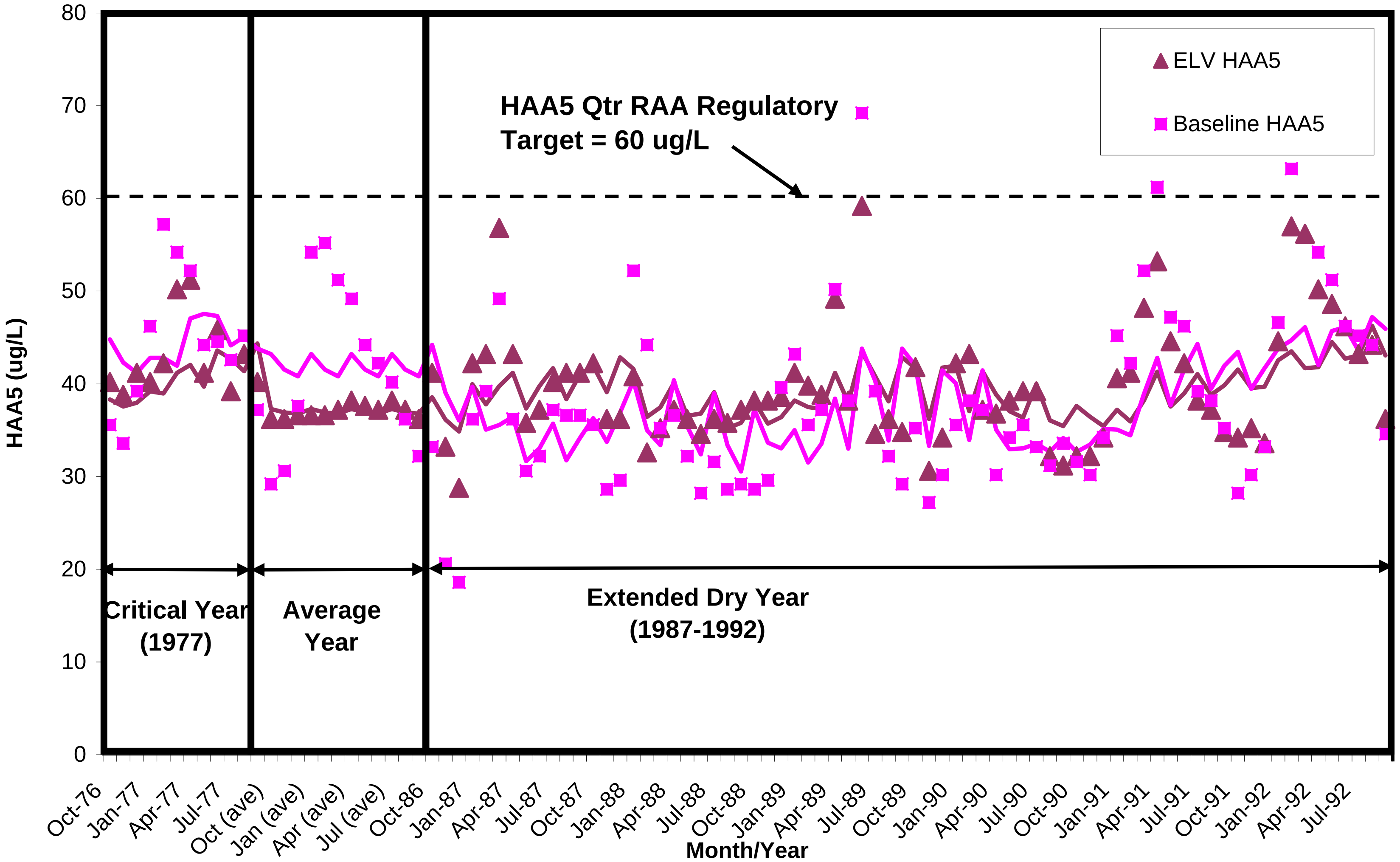


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of Zone 7 Baseline HAA5 with Concept HAA5 (UF & Conventional Treatment)

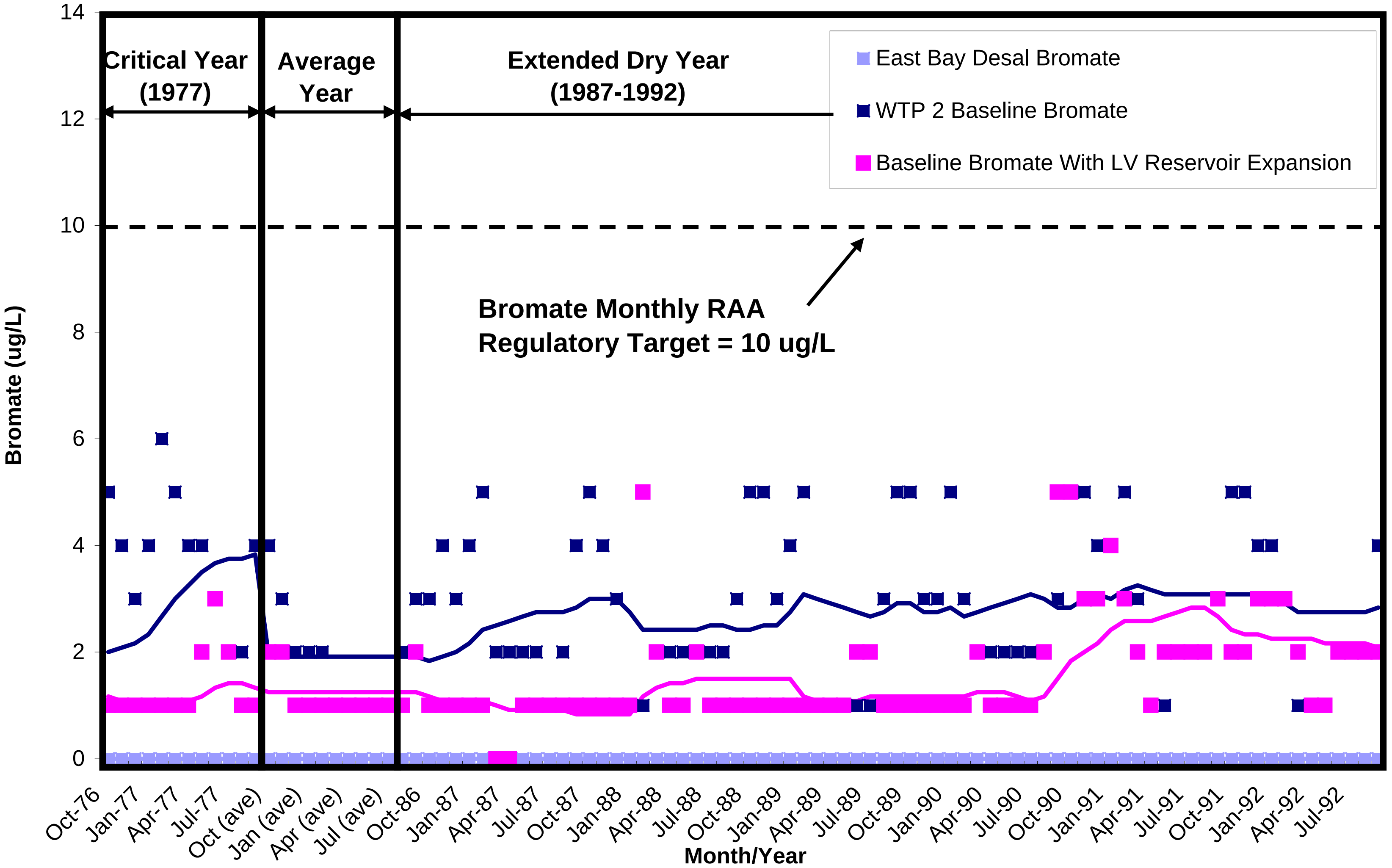


Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 8:12 blend of UF:conventionally treated supplies.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline Bromate with Concept Bromate (WTP 2)

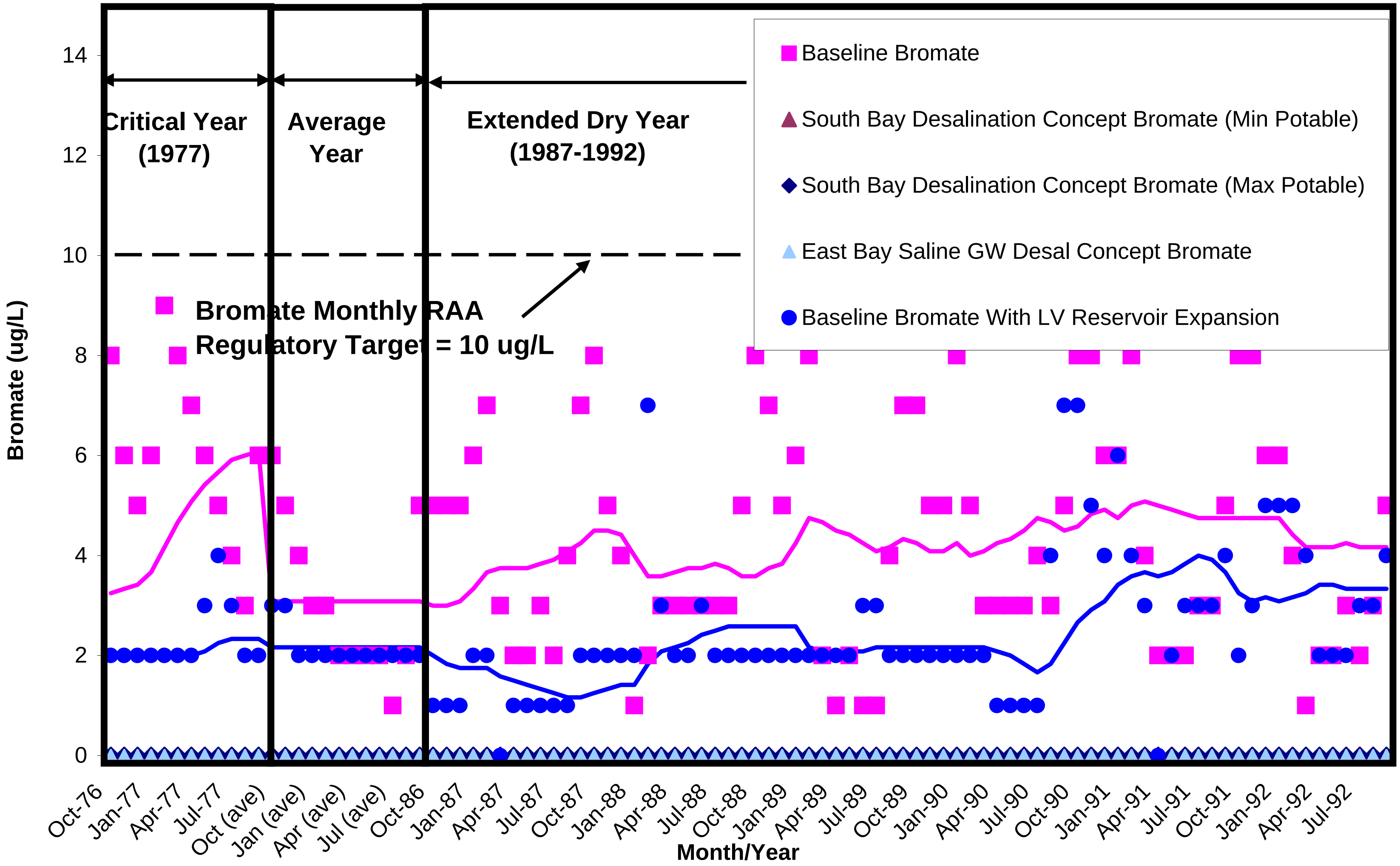


Note: East Bay Desal is not expected to generate detectable concentrations of bromate. The baseline bromate with Los Vaqueros Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline Bromate with Concept Bromate

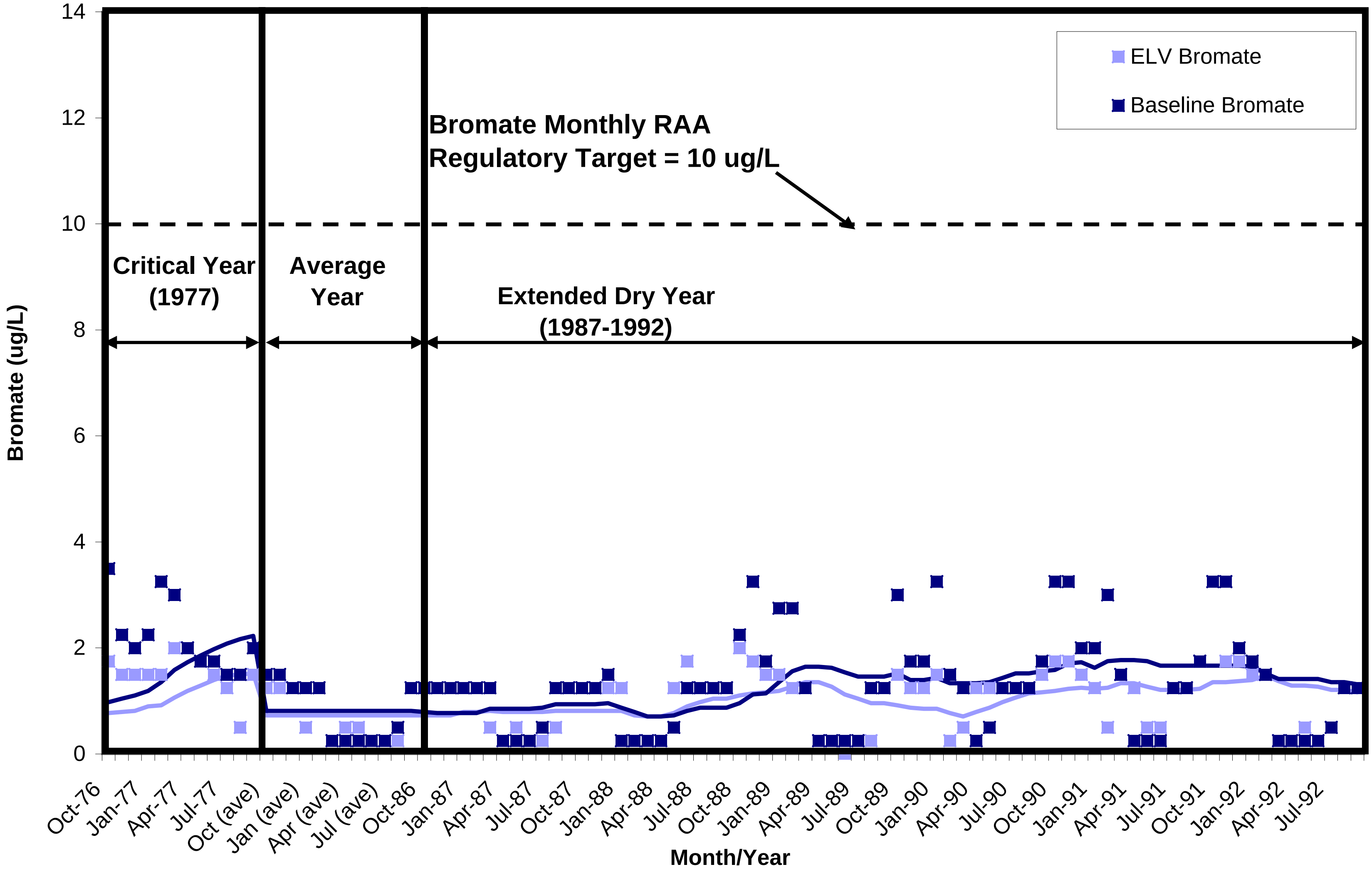


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline bromate with Los Vaqueros Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated baseline DBP production for settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Los Vaqueros Reservoir Expansion

Concepts Included:
Los Vaqueros Expansion
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of CCWD Baseline Bromate with Concept Bromate



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

G15 Maximize Water Supply Reliability with Calaveras Reservoir Expansion Portfolio

G15 Example Portfolio: Maximize Water Supply with Calaveras Reservoir Expansion

DESCRIPTION

The example Maximize Water Supply with Calaveras Reservoir Expansion Portfolio includes six concepts: Calaveras Reservoir Expansion, Regional Desalination Project, South Bay Desalination Concept, East Bay Saline Desalination Concept, Enhanced Conservation, and Recycled Water Concepts.

In this example portfolio, Calaveras Reservoir Expansion concept is included, along with all non-storage concepts with dry-year supply benefits.

All seven participating agencies are anticipated to benefit from this portfolio. Additional information on each of the included concepts is provided below.

Maximize Water Supply with Calaveras Reservoir Expansion Summary

Concepts Included:

- Calaveras Reservoir Expansion (maximize water supply)
- Regional Desalination Project
- South Bay Desalination
- East Bay Saline Groundwater Desalination
- Enhanced Conservation
- Water Recycling

Extended Dry Year Supply .... Up to 180,000 AFY

Average Year Water Quality Supply.............Up to 24,000 AFY

Cost ($2005)

Capital Cost	TBD in future studies
O&M Cost	TBD in future studies
Unit Cost	TBD in future studies

Potential Owning Agency
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC, Zone 7

Potential Partners
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC(1), Zone 7

NOTE: Supply quantities exclude RDP and Enhanced Conservation

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

❑ *Calaveras Reservoir Expansion (maximize water supply)*

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 acre-feet (AF) up to 420,000 AF. A San Francisco Public Utilities Commission (SFPUC) study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. The Bay Area Water Quality and Supply Reliability Program (BAWQ&SRP) is evaluating potential facilities that would be required and operating scenarios that could be implemented if the reservoir were expanded to 420,000 AF. These scenarios and facilities are presented for illustrative purposes and do not represent future operating scenarios endorsed by the SFPUC nor do they represent a complete characterization of all facilities that may be required.

This example portfolio includes Calaveras Reservoir expansion with a dry-year supply reliability operational scenario. For this scenario, Hetch Hetchy water would be transferred into the expanded Calaveras Reservoir in average and wet years, and this water would be stored for use during drought periods. Water could be delivered to the SFPUC system to meet dry-year demands, with deliveries to Santa Clara Valley Water District (SCVWD) via the SFPUC-SCVWD intertie, or could be delivered to the South Bay Aqueduct (SBA) via a new connection. If SCVWD deliveries are via the SBA, both SCVWD and Alameda County Water District (ACWD) would receive a dry-year water quality benefit. This concept provides up to 53,000 AFY of dry-year supply reliability water to SFPUC (retail and wholesale customers), ACWD and SCVWD.

❑ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, that will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are Contra Costa Water District (CCWD), East Bay Municipal Utility District (EBMUD), SFPUC and SCVWD. The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all-weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

❑ *South Bay Desalination Concept*

The South Bay Desalination concept could involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer. The upper aquifer is currently only used for small local domestic or agricultural purposes or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control plant (WQCP) in Palo Alto. Each of these plants is assumed to have a treated water production capacity of up to 4 MGD. The end use for the desalinated supply could be for non-potable irrigation and industrial use, or for potable use. Two different target supply and water quality ranges have been selected, corresponding to the alternatives for end use. The capacity of 4 MGD is assumed for potable supply. However, due to recycled water supplies available for irrigation and industrial uses, demand for these purposes is lower, and production capacity is assumed to be 1 MGD per plant. This portfolio includes potable supply projects at all three sites, with a potential dry-year supply benefit of 13,000 acre-feet per year (AFY) and an average year water quality benefit of 8,000 AFY. Water quality benefits were only assumed for concepts that could potentially offset SCVWD surface water or groundwater. Potential project beneficiaries include SCVWD, Bay Area Water Supply and Conservation Agency (BAWSCA) and SFPUC.

❑ *East Bay Saline Groundwater Desalination Project*

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD (treated production capacity) desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the saline portion of the Newark Aquifer. Water would be extracted through a series of bay-shore perimeter wells within ACWD's service district area. Finished water could be pumped directly into ACWD's distribution system or SFPUC's Bay Division Pipelines 1& 2 in its regional transmission system. Concentrate discharge could potentially be disposed of by delivering it to the East Bay Discharge Authority (EBDA) discharge pipeline, several miles north of the project area, or other options to be identified and evaluated during project planning. This concept has a potential dry-year supply reliability and average year water quality benefit of up to 16,000 AFY. Potential beneficiaries are ACWD (dry-year supply and average year water quality) , SFPUC (dry-year supply only for retail and wholesale customers), and SCVWD (details to be developed in future studies).

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SRP. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G15-1 - Supply Reliability Score Card

Performance	**Baseline**		**Portfolio[1,2]**		**Baseline Plus Portfolio[1,2]**		
Measure/Objective	**Amount or Description**	**Units**	**Amount or**	**Units**	**Amount or**	**Units**	**Notes/Other**
Meet Demands							
Critical Drought							SFPUC, BAWSCA (as SFPUC wholesale customers), SCVWD, and ACWD are potential beneficiaries of the Calaveras Reservoir Expansion. BAWSCA, SFPUC, and SCVWD are all listed as beneficiaries for the South Bay Desalination Concepts. Maximum concept yield is displayed for all agencies. SFPUC (retail and wholesale customers, BAWSCA member agencies), SCVWD, EBMUD and CCWD will benefit from the Regional Desalination Project, though supply quantities and allocations are to be determined as part of the RDP. ACWD, SCVWD (details to be determined as part of future studies), BAWSCA and SFPUC will benefit from the East Bay Saline Groundwater Desalination facility, though allocations have not been assumed and and maximum concept yield is displayed for both agencies. All participating agencies will benefit from Enhanced Conservation though no yield has been identified for that concept. Because some agencies consider recycled water yield as necessary for meeting baseline demand, potential yields from Recycled Water concepts have been included in the Portfolio Yield column, but not in the Baseline Plus Portfolio column. For Zone 7, yield is assumed to offset SBA supplies.
ACWD Supply	20,600	AFY	Up to 70,650	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply	137,800	AFY	Up to 118,636	AFY	Up to 220,600	AFY	
CCWD Supply	176,800	AFY	Up to 22,520	AFY	176,800	AFY	
EBMUD Supply	200,430	AFY	Up to 15,366	AFY	200,430	AFY	
SCVWD Supply	39,400	AFY	Up to 102,494	AFY	Up to 97,800	AFY	
SFPUC Supply	157,000	AFY	Up to 137,056	AFY	Up to 239,800	AFY	
Zone 7 Supply (SWP)	38,900	AFY	Up to 6,890	AFY	38,900	AFY	
Total Supply[3]	633,130	AFY	Up to 179,782	AFY	Up to 715,930	AFY	
Extended Drought							
ACWD Supply	25,500	AFY	Up to 70,650	AFY	Up to 42,700	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 118,636	AFY	Up to 292,700	AFY	
CCWD Supply	170,800	AFY	Up to 22,520	AFY	Up to 176,800	AFY	
EBMUD Supply	216,420	AFY	Up to 15,366	AFY	216,420	AFY	
SCVWD Supply	63,000	AFY	Up to 102,494	AFY	Up to 97,800	AFY	
SFPUC Supply	255,000	AFY	Up to 137,056	AFY	Up to 329,000	AFY	
Zone 7 Supply (SWP)	56,400	AFY	Up to 6,890	AFY	56,400	AFY	
Total Supply[3]	787,120	AFY	Up to 179,782	AFY	Up to 869,920	AFY	
Average Year							
ACWD Supply	42,700	AFY	Up to 17,650	AFY	42,700	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 60,136	AFY	345,000	AFY	
CCWD Supply	139,400	AFY	Up to 22,520	AFY	Up to 176,800	AFY	
EBMUD Supply	255,590	AFY	Up to 15,366	AFY	255,590	AFY	
SCVWD Supply	97,800	AFY	Up to 43,994	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	Up to 54,256	AFY	329,000	AFY	
Zone 7 Supply (SWP)	71,400	AFY	Up to 6,890	AFY	71,400	AFY	
Total Supply[3]	935,890	AFY	Up to 121,282	AFY	Up to 960,190	AFY	
Vulnerability							
ACWD	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - East Bay Saline Groundwater Desalination provides separate connection point to ACWD if South Bay Aqueduct or SFPUC supply were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
BAWSCA Agencies	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - South Bay Desalination and potentially the Regional Desalination Project could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply.				
CCWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - South Bay Desalination concepts could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply, but only a small fraction of SCVWD customers could be served. Regional Desalination Project and East Bay Saline Groundwater Desalination could potentially provide additional supply source in the event of a supply disruption of imported supply.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		Reduces Vulnerability - East Bay Saline Groundwater Desalination could provide small supply source to retail and wholesale customers in the event of a supply disruption on the Hetch Hetchy Aqueduct. Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption on the Hetch Hetchy Aqueduct, though supply quantities and conveyance mechanisms are to be determined by the RDP. South Bay Desalination could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption on the Hetch Hetchy Aqueduct, but only a small fraction of SFPUC customers could be served.				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		No Effect on Vulnerability - Since concepts provide non-potable supplies or augment existing supplies, they do not reduce the vulnerability of Zone 7 potable system.				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - South Bay Desalination, Regional Desalination Project, East Bay Saline Groundwater Desalination, Water Recycling Concepts and Enhanced Conservation would be locally controlled.							

1. Some agencies include recycled water supplies in future supply projections. As a result, recycled water has not been considered as an additional supply, and does not result in an increased total supply as compared to baseline.
2. Supply quantities and allocations for the Regional Desalination facility(ies) are to be determined by the Regional Desalination Project, and are not included in these numbers.
3. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G15-2 - Public Health Protection Scorecard (Page 1 of 2)

Performance Measure/Objective	Portfolio		Baseline Plus Portfolio[1]		Notes
	Source Water	Treated Water	Source Water	Treated Water	
Variability for Treatment					
ACWD	Reduces Variability	NA	Reduces Variability	NA	East Bay Saline Groundwater Desalination Concept and Calaveras Reservoir Expansion will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	NA	NA	NA	BAWSCA agencies receive treated supplies.
CCWD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Calaveras Reservoir Expansion concept, East Bay Saline Groundwater Desalination, and South Bay Desalination Concepts will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2]	NA	TBD[2]	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
Zone 7	No Effect on Variability	NA	No Effect on Variability	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality.
Total Dissolved Solids					
ACWD	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Calaveras Reservoir Expansion and East Bay Saline Groundwater Desalination Concept will reduce TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	Reduces TDS	Reduces TDS	Reduces TDS	Reduces TDS	Calaveras Reservoir Expansion will reduce TDS. East Bay Saline Groundwater Desalination and South Bay Desalinated supply for potable use will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Calaveras Reservoir Expansion will reduce TDS. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. East Bay Saline Groundwater Desalination and South Bay Desalinated supply for potable use will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination will be treated to SFPUC TDS levels, and Calaveras Reservoir Expansion will have minimal effect on TDS. South Bay Desalinated supply for potable use will be treated to match existing TDS.
Zone 7	No Effect on TDS	No Effect on TDS	No Effect on TDS	No Effect on TDS	Recycled water projects are assumed to have no benefit or impact to potable water quality.
Disinfection By-Products					
ACWD	NA	Reduces DBPs	NA	Reduces DBPs	Calaveras Reservoir Expansion and East Bay Saline Groundwater Desalination Concept will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	Reduces DBPs	NA	Reduces DBPs	Calaveras Reservoir Expansion, East Bay Saline Groundwater Desalination and South Bay Desalinated supply for potable use will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Calaveras Reservoir Expansion, East Bay Saline Groundwater Desalination, and and South Bay Desalinated supply for potable use will reduce DBPs. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination and South Bay Desalination will reduce DBPs.
Zone 7	NA	No Effect on DBPs	NA	No Effect on DBPs	Recycled water projects are assumed to have no benefit or impact to potable water quality.

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part of the RDP.

Table G15-2 - Public Health Protection Scorecard (Page 2 of 2)

Performance Measure/Objective	**Portfolio**		**Baseline Plus Portfolio[1]**		**Notes**
	Source Water	**Treated Water**	**Source Water**	**Treated Water**	
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	Improves T&O	NA	Improves T&O	Calaveras Reservoir Expansion and East Bay Saline Groundwater Desalination Concept will improve overall quality and taste and odor.
BAWSCA Agencies	NA	Improves T&O	NA	Improves T&O	Calaveras Reservoir Expansion, East Bay Saline Groundwater Desalination, and South Bay Desalinated supply for potable use will improve overall water quality and improve taste and odor.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. East Bay Saline Groundwater Desalination and South Bay Desalinated supply for potable use will improve overall quality and taste and odor. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination and South Bay Desalination concepts will slightly improve overall quality and taste
Zone 7	NA	NA	NA	No Effect on T&O	Recycled water projects are assumed to have no benefit or impact to potable water quality.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Calaveras Reservoir Expansion and East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water quality from known contaminants (e.g., TDS).
BAWSCA Agencies	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Calaveras Reservoir Expansion, East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water from known contaminants (e.g., TDS).
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Calaveras Reservoir Expansion, South Bay Desalinated supply for potable use, and East Bay Saline Groundwater Desalination are not expected to degrade taste and odor from known contaminants. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected.
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Calaveras Reservoir Expansion, South Bay Desalinated supply for potable use, and East Bay Saline Groundwater Desalination are not expected to degrade taste and odor from known contaminants. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected.
Zone 7	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	Recycled water projects are not projected to degrade potable water quality from known contaminants.
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality i advanced treatment is not pursued for concepts implemented over groundwater basins. Even with advanced treatment, emerging contaminants including NDMA and pharmaceuticals may be introduced into the groundwater basin due to usage of recycled water. Emerging contaminants such as algal biotoxins may be a factor with desalinated bay and seawater supplies and the reservoir expansion (algal bloom potential).
BAWSCA Agencies	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
Zone 7	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part o the RDP.

Table G15-2a - Public Health Protection Score Card by Agency

Agency: ACWD

			Agency Baseline			Concept: East Bay Saline Groundwater Desalination[1]		Agency Baseline			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**Agency Baseline Calaveras Expansion Source Water**	**Agency Baseline Plus Calaveras Expansion Treated Water (MSJWTP)**	**Agency Baseline Plus Calaveras Expansion Treated Water (WTP2)**	**Notes**
Supply Quantity											
Critical Year		AFY	20,600			16,000		42,700			
Extended Dry Year		AFY	25,500			16,000		42,700			
Average Year		AFY	42,700			16,000		42,700			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	0.02	0.07 - 0.10	0.05 - 0.07	0.06 - 0.09	
	Mean	mg/L	0.37	0.28	0.33	NA	0.02	0.08	0.05	0.07	
TOC	Range	mg/L	3.4 - 7.33	2.9 - 6.4	2.3 - 5.5	NA	0.1	2.8 - 3.2	2.4 - 2.7	1.9 - 2.2	
	Mean	mg/L	5.06	4.38	3.7	NA	0.1	3.0	2.5	2.0	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.41	0.04 - 0.47	NA	0.02	0.05 - 0.15	0.03 - 0.11	0.04 - 0.17	
	Mean	mg/L	0.26	0.20	0.23	NA	0.02	0.11	0.08	0.10	
TOC	Range	mg/L	1.6 - 7.33	1.3 - 6.4	0.9 - 5.5	NA	0.1	2.3 - 6.1	1.9 - 5.3	1.5 - 4.5	
	Mean	mg/L	3.70	3.17	2.6	NA	0.1	3.2	2.7	2.2	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	0.02	0.07 - 0.10	0.05 - 0.07	0.06 - 0.09	
	Mean	mg/L	0.19	0.14	0.17	NA	0.02	0.08	0.05	0.07	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	0.1	2.8 - 3.2	2.4 - 2.7	1.9 - 2.2	
	Mean	mg/L	3.99	3.43	2.8	NA	0.1	3.0	2.5	2.0	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	somewhat variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	40	276 - 286	298 - 308	307 - 317	
	Mean	mg/L	507	529	561	NA	40	285	307	339	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	40	166 - 293	188 - 315	197 - 324	
	Mean	mg/L	384	406	438	NA	40	249	272	303	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	40	173 - 195	195 - 218	204 - 226	
	Mean	mg/L	296	319	350	NA	40	182	205	236	
Disinfection Byproducts											
Critical Year											
Bromate	Range	mg/L	NA	ND - ND	2 - 6	NA	ND	NA	ND - ND	1 - 1	
	Mean	mg/L	NA	ND	4	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	82 - 153	26 - 42	NA	ND	NA	60 - 69	19 - 21	
	Mean	mg/L	NA	110	33	NA	ND	NA	63	20	
HAA5	Range	mg/L	NA	47 - 75	16 - 21	NA	1	NA	50 - 53	17 - 18	
	Mean	mg/L	NA	61	19	NA	1	NA	52	18	
Extended Dry Year											
Bromate	Range	mg/L	NA	ND - ND	1 - 5	NA	ND	NA	ND - ND	1 - 2	
	Mean	mg/L	NA	ND	3	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	50 - 142	16 - 38	NA	ND	NA	52 - 105	17 - 64	
	Mean	mg/L	NA	83	26	NA	ND	NA	68	22	
HAA5	Range	mg/L	NA	22 - 92	11 - 26	NA	1	NA	34 - 90	15 - 26	
	Mean	mg/L	NA	52	17	NA	1	NA	52	18	
Average Year											
Bromate	Range	mg/L	NA	ND - ND	1 - 4	NA	ND	NA	ND - ND	1 - 1	
	Mean	mg/L	NA	ND	2	NA	ND	NA	ND	1	
THM4	Range	mg/L	NA	68 - 116	21 - 33	NA	ND	NA	50 - 64	19 - 21	
	Mean	mg/L	NA	85	26	NA	ND	NA	59	20	
HAA5	Range	mg/L	NA	41 - 74	14 - 22	NA	1	NA	51 - 63	17 - 18	
	Mean	mg/L	NA	57	19	NA	1	NA	55	18	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal	NA	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.

Table G15-2b - Public Health Protection Score Card by Agency

Agency: SCVWD

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline		Concept: East Bay Saline Groundwater Desalination[1]		Concept: South Bay Desalination (Potable)[2]		Concept: South Bay Desalination (Irrigation)[3]		Baseline Plus Portfolio		Notes
			SCVWD Source Water (SWP)	**SCVWD Treated Water (SWP)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination (Potable) Treated Water**	**South Bay Desalination (Non-Potable) Source Water**	**South Bay Desalination (Non-Potable) Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water**	
Supply Quantity													
Critical Year		AFY	39,400		16,000		13,800		3,200		92,400		
Extended Dry Year		AFY	63,000		16,000		13,800		3,200		97,800		
Average Year		AFY	97,800		16,000		8,300		3,200		NA		
Variability for Treatment													
Critical Year													
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.07 - 0.10	0.06 - 0.09	
	Mean	mg/L	0.37	0.33	NA	0.02	NA	0.08	NA	0.17	0.08	0.06	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	2.8 - 3.2	2.5 - 2.9	
	Mean	mg/L	5.1	3.9	NA	0.1	NA	0.6	NA	1.2	3.0	2.7	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year													
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.05 - 0.15	0.04 - 0.13	
	Mean	mg/L	0.26	0.24	NA	0.02	NA	0.08	NA	0.17	0.11	0.09	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	2.3 - 6.1	2.1 - 5.6	
	Mean	mg/L	3.7	2.7	NA	0.1	NA	0.6	NA	1.2	3.2	2.9	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Average Year													
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.07 - 0.10	0.06 - 0.09	
	Mean	mg/L	0.19	0.17	NA	0.02	NA	0.08	NA	0.17	0.08	0.06	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	2.8 - 3.2	2.5 - 2.9	
	Mean	mg/L	4.0	3.0	NA	0.1	NA	0.6	NA	1.2	3.0	2.7	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids													
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	40	NA	40 - 280	NA	290 - 500	276 - 286	296 - 305	
	Mean	mg/L	507	527	NA	40	NA	160	NA	395	285	305	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	40	NA	40 - 280	NA	290 - 500	166 - 293	185 - 313	
	Mean	mg/L	384	404	NA	40	NA	160	NA	395	249	269	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	40	NA	40 - 280	NA	290 - 500	173 - 195	192 - 215	
	Mean	mg/L	296	316	NA	40	NA	160	NA	395	182	202	
Minimize Disinfection Byproducts													
Critical Year													
Bromate	Range	mg/L	NA	3 - 9	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - 1	
	Mean	mg/L	NA	6	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	27 - 44	NA	ND	NA	1 - 6	NA	6 - 11	NA	26 - 29	
	Mean	mg/L	NA	34	NA	ND	NA	1	NA	6	NA	27	
HAA5	Range	mg/L	NA	11 - 14	NA	1	NA	2 - 7	NA	7 - 11	NA	15 - 16	
	Mean	mg/L	NA	13	NA	1	NA	2	NA	7	NA	16	
Extended Dry Year													
Bromate	Range	mg/L	NA	1 - 8	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - 1	
	Mean	mg/L	NA	4	NA	ND	NA	ND	NA	ND	NA	1	
THM4	Range	mg/L	NA	16 - 40	NA	ND	NA	1 - 6	NA	6 - 11	NA	17 - 38	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	NA	29	
HAA5	Range	mg/L	NA	7 - 18	NA	1	NA	2 - 7	NA	7 - 11	NA	13 - 22	
	Mean	mg/L	NA	11	NA	1	NA	2	NA	7	NA	15	
Average Year													
Bromate	Range	mg/L	NA	1 - 6	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - 1	
	Mean	mg/L	NA	3	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	22 - 34	NA	ND	NA	1 - 6	NA	6 - 11	NA	26 - 29	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	NA	27	
HAA5	Range	mg/L	NA	9 - 15	NA	1	NA	2 - 7	NA	7 - 11	NA	15 - 16	
	Mean	mg/L	NA	12	NA	1	NA	2	NA	7	NA	16	
Minimize Taste and Odor													
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	improved overall quality	improved T&O	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	NA	NA	likelihood	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.

2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

3. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Table G15-2c - Public Health Protection Score Card by Agency

Agency: SFPUC

			Agency Baseline		**Concept: East Bay Saline Groundwater Desalination[1]**		**Concept: South Bay Desalination (Potable)[2]**		**Concept: South Bay Desalination (Irrigation) Non-potable[3]**		**Baseline Plus Portfolio**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SFPUC Source Water**	**SFPUC Treated Water**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination (Potable) Treated Water**	**South Bay Desalination (Non-Potable) Source Water**	**South Bay Desalination (Non-Potable) Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity													
Critical Year		AFY	157,000		16,000		13,800		3,200		210,000		
Extended Dry Year		AFY	255,000		16,000		13,800		3,200		308,000		
Average Year		AFY	329,000		0		0		3,200		329,000		
Variability for Treatment													
Critical Year													
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.01 - 0.03	0.01 - 0.01	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	1.4 - 3.1	1.4 - 2.7	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	2.0	1.9	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year													
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.01 - 0.04	0.01 - 0.03	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	1.4 - 3.4	1.4 - 3.0	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	1.9	1.8	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Average Year													
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	0.01 - 0.03	0.01 - 0.01	
	Mean	mg/L	0.01	0.01	NA	0.02	NA	0.08	NA	0.17	0.02	0.01	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	1.5 - 2.8	1.2 - 1.7	
	Mean	mg/L	1.7	1.6	NA	0.1	NA	0.6	NA	1.2	2.0	1.4	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	pH is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids													
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40	NA	40 - 280	NA	290 - 500	16 - 45	32 - 61	
	Mean	mg/L	26	26	NA	40	NA	160	NA	395	31	47	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40	NA	40 - 280	NA	290 - 500	16 - 98	32 - 114	
	Mean	mg/L	42	42	NA	40	NA	160	NA	395	39	55	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40	NA	40 - 280	NA	290 - 500	30 - 82	46 - 98	
	Mean	mg/L	40	40	NA	40	NA	160	NA	395	52	68	
Disinfection Byproducts													
Critical Year													
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	34 - 47	NA	ND	NA	1 - 6	NA	6 - 11	NA	30 - 39	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	NA	34	
HAA5	Range	mg/L	NA	28 - 40	NA	1	NA	2 - 7	NA	7 - 11	NA	25 - 32	
	Mean	mg/L	NA	32	NA	1	NA	2	NA	7	NA	29	
Extended Dry Year													
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	33 - 50	NA	ND	NA	1 - 6	NA	6 - 11	NA	30 - 43	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	NA	35	
HAA5	Range	mg/L	NA	24 - 44	NA	1	NA	2 - 7	NA	7 - 11	NA	24 - 39	
	Mean	mg/L	NA	30	NA	1	NA	2	NA	7	NA	28	
Average Year													
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	24 - 43	NA	ND	NA	1 - 6	NA	6 - 11	NA	24 - 44	
	Mean	mg/L	NA	33	NA	ND	NA	1	NA	6	NA	34	
HAA5	Range	mg/L	NA	22 - 34	NA	1	NA	2 - 7	NA	7 - 11	NA	20 - 35	
	Mean	mg/L	NA	28	NA	1	NA	2	NA	7	NA	27	
Taste and Odor													
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	No change	No change	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	NA	likelihood	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.
2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.
3. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G15-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	Portfolio Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Calaveras Reservoir Expansion: Capital costs for the Calaveras Reservoir Expansion include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing station. Pumping costs estimated as $3.5 M/year. All costs in $2003. Operating costs and annualized costs to be determined as part of future SFPUC studies. Regional Desalination Project: Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. East Bay Saline Groundwater Desalination: East Bay Saline Groundwater Desalination facilities are estimated as $75 million ($2005). South Bay Desalination: South Bay Desalination facility capital costs are estimated at $14 to $138 million, and O&M costs at $3 to $10 million ($2005), depending on selected water quality targets. Water Recycling: Recycled water capital costs are estimated as $839 million ($2005). Enhanced Conservation: No cost estimates are available for Enhanced Conservation.
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	Allocation of Costs will not be determined as part of this study.
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): High Impact.** The overall impact of the Calaveras Reservoir expansion in combination with other projects (excluding the RDP) would be high, and thus outweigh the not-yet-determined potential impacts of the RDP. The level of impact associated with the RDP is not known but would depend on the location and operations of the facility.In general, if the RDP is sited in an area of sensitive habitat and would require construction and operation of a surface water intake, potential adverse effects to aquatic and wetland resources would occur. In addition, brackish and seawater desalination plants consumes large amount of energy. Depending on the location of other facilities (e.g., recycling plant, conveyance facilities, interties), potential effects to biological resources could occur; however, these facilities would be located in disturbed areas to the extent feasible, thus reducing their potential for adverse impacts. The South Bay Desalination plants would unlikely affect biological resources as they would be located in existing, disturbed areas. **Overall Impacts to the Environment (After Mitigation):TBD[1].** Mitigation opportunities would be developed to reduce high impacts to the environment. For the Calaveras Reservoir expansion, a mitigation strategy would provide for resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by the regulatory agencies. For the RDP, mitigation opportunities would depend on the location, but could include the design of the water intake with state-of-the-art screens to reduce entrainment/impingement of aquatic resources, use of energy recovery devices or participation in PG&E voluntary programs to reduce energy consumption, and administration of relevant studies on the potential effects to aquatic resources. In general, mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources for all portfolio facilities include, but are not limited to, alternative siting of facilities to avoid sensitive resources, preconstruction surveys, implementation of standard BMPs, restriction on construction schedule, monitoring, and if necessary, acquisition of regulatory permits and implementation of regulatory permit conditions.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): TBD[1].** The benefits associated with the RDP would depend on the location and operation of the desalination facilities. If any of the concept reduces spring pumping from the Delta (e.g., East Bay Saline Groundwater Desalination), there would be environmental benefits to the Delta. Reuse of water through water recycling and conservation are considered a benefit to the environment because it reduces demand for new water supplies, and thus construction- and operation-related effects on the environment. **Overall Benefits to the Environment (After Mitigation): High Benefits.** A mitigation strategy for Calaveras Reservoir expansion that provides for resource restoration or enhancement in and around the watershed would provide overall benefits.	
Implementation Potential		
External Support	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefitting agencies, will increase the likelihood of external funding.	
Consistency with Local and Regional Plans[2]	TBD[1] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	7	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	6,300,000 people	

1. Assessments and ratings depend on supply quantities, water qualities, site(s) selected, supply allocations, and/or conveyance mechanisms to be determined as part of the RDP.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Table G15-4 - Environmental Score Card (Page 1 of 2)

Performance Measure/Objective	Portfolio Rating
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Calaveras Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could affect aquatic habitat. In addition, concept development may affect steelhead restoration within Alameda Creek Watershed. Impacts to aquatic environment from the location and operations of the RDP have not been determined. Potential long-term, adverse effects to aquatic resources associated with operation of the desalination plant using surface water intakes occur from entrainment and impingement, and discharge of brine. Brine discharge from the RDP would likely be combined with either wastewater effluent or blow-down water from the power plant; adverse effects would unlikely occur if the combined brine discharge complies with NPDES standards. Operational impacts to aquatic resources are not expected from the East Bay Saline Groundwater and South Bay Desalination concepts, as these facilities would use groundwater as the source water (thus eliminating potential effects to surface aquatic resources). Brine from these facilities would be combined with effluent or power plant blow-down water such that the brine would be mixed and diluted prior to discharge. If the East Bay Desalination supply offsets SBA supply during normal years, there may be a reduction in spring and summer pumping from the Delta and thus benefits to Delta resources. Other minor potential effects on the aquatic environment are associated with improperly treated reclaimed water being discharged into biological sensitive areas (for recycling concepts), and general construction activities that could increase stormwater runoff to nearby creeks and drainages, and thus affect aquatic resources (for all concepts). **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies. Also, continue trout planting. Mitigation opportunities for the RDP would depend on its location, and could include, but not be limited to, design of the intake with state-of-the-art screens and administration of relevant studies on the potential effects to aquatic resources. For both Calaveras Expansion and the RDP, where sensitive resources would be affected, then the following would apply: consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Mitigation opportunities for potential impacts on sensitive biological resources from operation of recycling facilities include compliance with Title 22 requirements on treatment standards. General mitigation opportunities to reduce short-term construction effects (for all concepts) include, but are not limited to, implementation of standard BMPs (e.g., sediment and erosion control), and restriction on construction schedule (e.g.,. avoid construction activities in creeks during the wet season).
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Calaveras Reservoir Expansion would directly (from inundation) and indirectly (from construction of other facilities) affect terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and area of potential serpentine associated plants. Impacts to the terrestrial environment from development of all other concepts would depend on the location of the facilities. South Bay Desalination treatment facilities would be located on existing, disturbed areas (e.g, power plants or the WQCP) and is not expected to result in adverse effects to terrestrial resources. Where facilities are not known (e.g., RDP, East Bay Saline Groundwater Desalination facilities, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to sensitive terrestrial habitat could occur if facilities are located on these resources. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations. Mitigation opportunities for long-term effects to the terrestrial environment would be avoidance of sensitive terrestrial habitat to the extent possible through alternative siting. For Calaveras Reservoir expansion, a mitigation strategy that provides for resource restoration or enhancement in and around the watershed would be implemented (replacement ratios of lost habitat may be 3:1 or as deemed appropriate by the regulatory agency). The protection, restoration, and/or enhancement of land would be a benefit. General mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources include, but are not limited to, implementation of standard BMPs (e.g., fence sensitive terrestrial habitats to ensure avoidance), and acquisition of regulatory permits and compliance with permit conditions.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

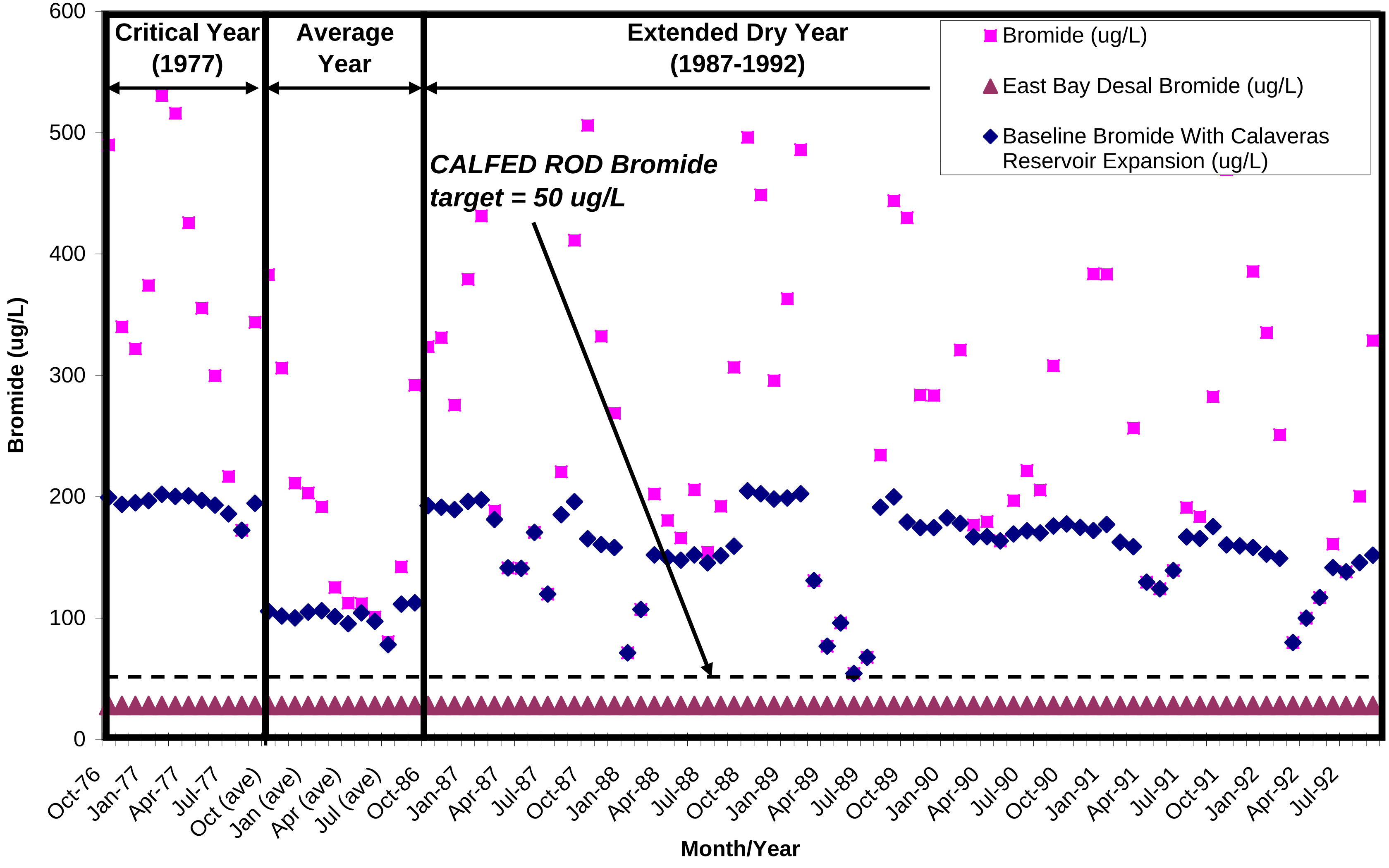
Table G15-4 - Environmental Score Card (Page 2 of 2)

Performance Measure/Objective	Portfolio Rating
Wetlands	
Potential Impacts to Wetland Resources (acreage affected, mitigation)	**Effects on Wetlands (Before Mitigation): Impacts.** Expansion of Calaveras Reservoir would result in inundation of marsh habitat. Impacts to wetland resources from other facilities development would depend on the location of the individual concept facilities. Although the location of the RDP has not been determined, potential wetlands could be adversely affected if the plant or intake pipelines occur through wetlands. The South Bay Desalination plants would be located within existing, disturbed areas (e.g., power plant, WQCP). Recycled water project facilities have not yet been determined but would likely be located in disturbed areas to avoid wetland resources to the extent feasible. A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of conveyance facilities and interties for all concepts may temporarily affect wetland resources (e.g., creek crossing). **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce adverse effects to wetland resources would be avoidance to the extent possible through alternative siting. If wetlands resources are affected, they would be replaced at a ratio of 3:1 or at a ratio deemed appropriate by regulatory agencies. Consultation with regulatory agencies, permit acquisition, and compliance with permit conditions would be required. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations. General mitigation opportunities to reduce short-term construction and potentially long-term effects to wetland resources include, but are not limited to, delineation of wetlands, implementation of standard BMPs (e.g., installation of silt fence to prevent runoff into wetlands), restriction on construction schedule (limit construction through creeks during dry seasons only), and monitoring.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): Impacts.** Impacts to special-status plant and wildlife species from development of all concepts would depend on the habitat affected, which is determined by the location of the concept facilities. Expansion of Calaveras Reservoir could affect the following species: Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. As described above, the location of the RDP has not been determined; construction and operation of a desalination plant (including a surface water intake and discharge of brine) may affect special-status fisheries or other plant and wildlife species associated with wetlands habitat. The South Bay Desalination plants would be located in disturbed areas (e.g., power plant, WQCP), and effects to special-status species are unlikely. Where facilities are not known (e.g., East Bay Saline Groundwater Desalination plant, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to special-status species could occur if facilities are located within or adjacent to habitat for these species. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities for the RDP have not been identified; they would be determined based on its location and operations. Mitigation opportunities for effects to special-status species would be avoidance of sensitive habitats to the extent possible, or acquisition of regulatory permits and implementation of regulatory permit conditions if impacts occur. In addition, general mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., construction during non-nesting or -breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** All facilities would consume energy. Pollutant emissions would be associated with energy production. Due to the size and energy requirement of the RDP, it would result in the most energy consumption. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** The energy requirement for the RDP could be reduced with implementation of energy recovery devices. Participating agencies could enroll in voluntary PG&E Demand Response Programs to reduce demand on the electrical system during peak consumption periods. However, the total amount of energy consumed and pollutants emitted would still be considered an increase. Further evaluation would be required to determine the mitigation opportunities for the Calaveras Reservoir expansion concept.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water Bromide with Concept Bromide

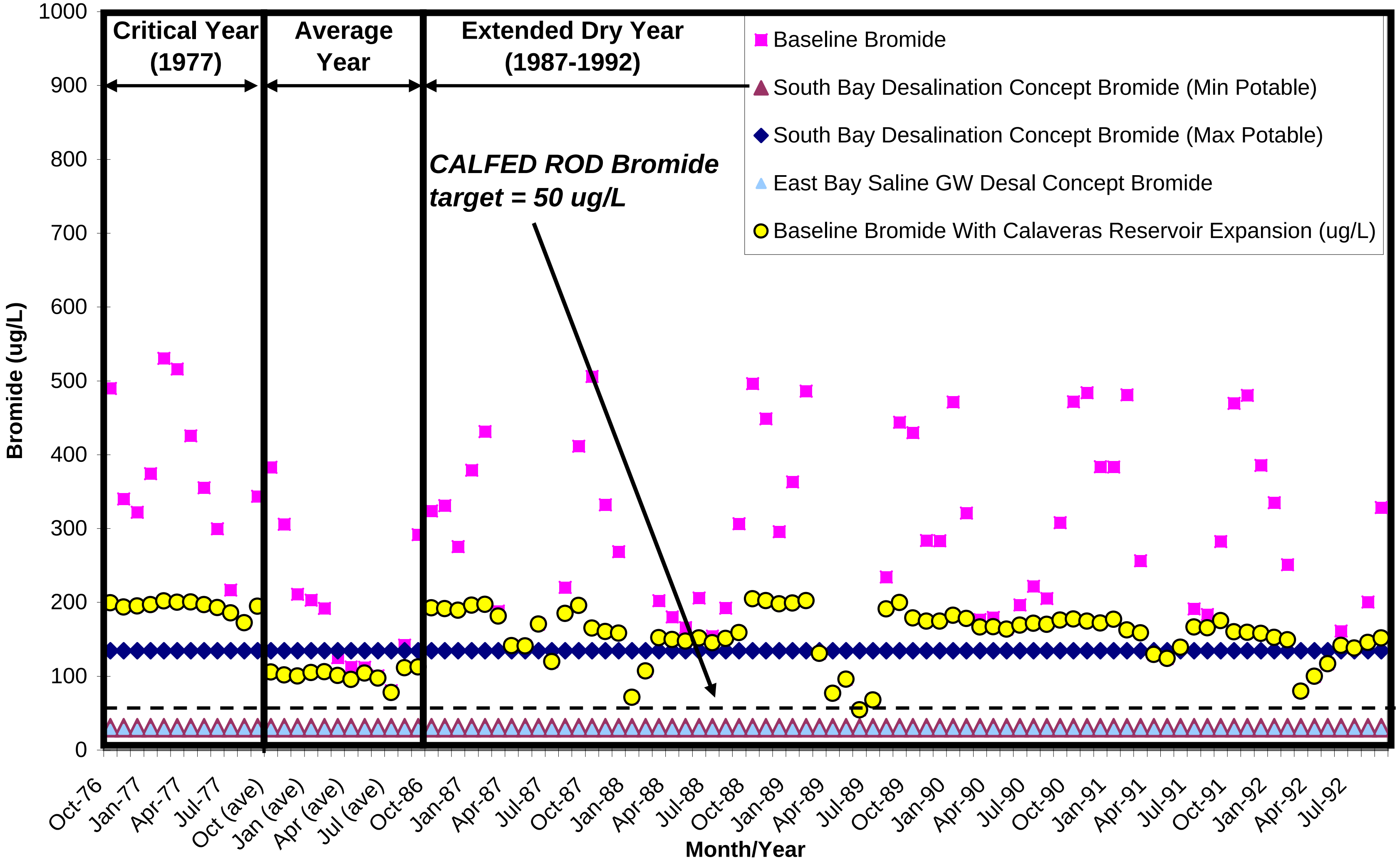


Note: East Bay Desal Bromide reflects bromide in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline bromide with Calaveras Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water Bromide with Concept Bromide

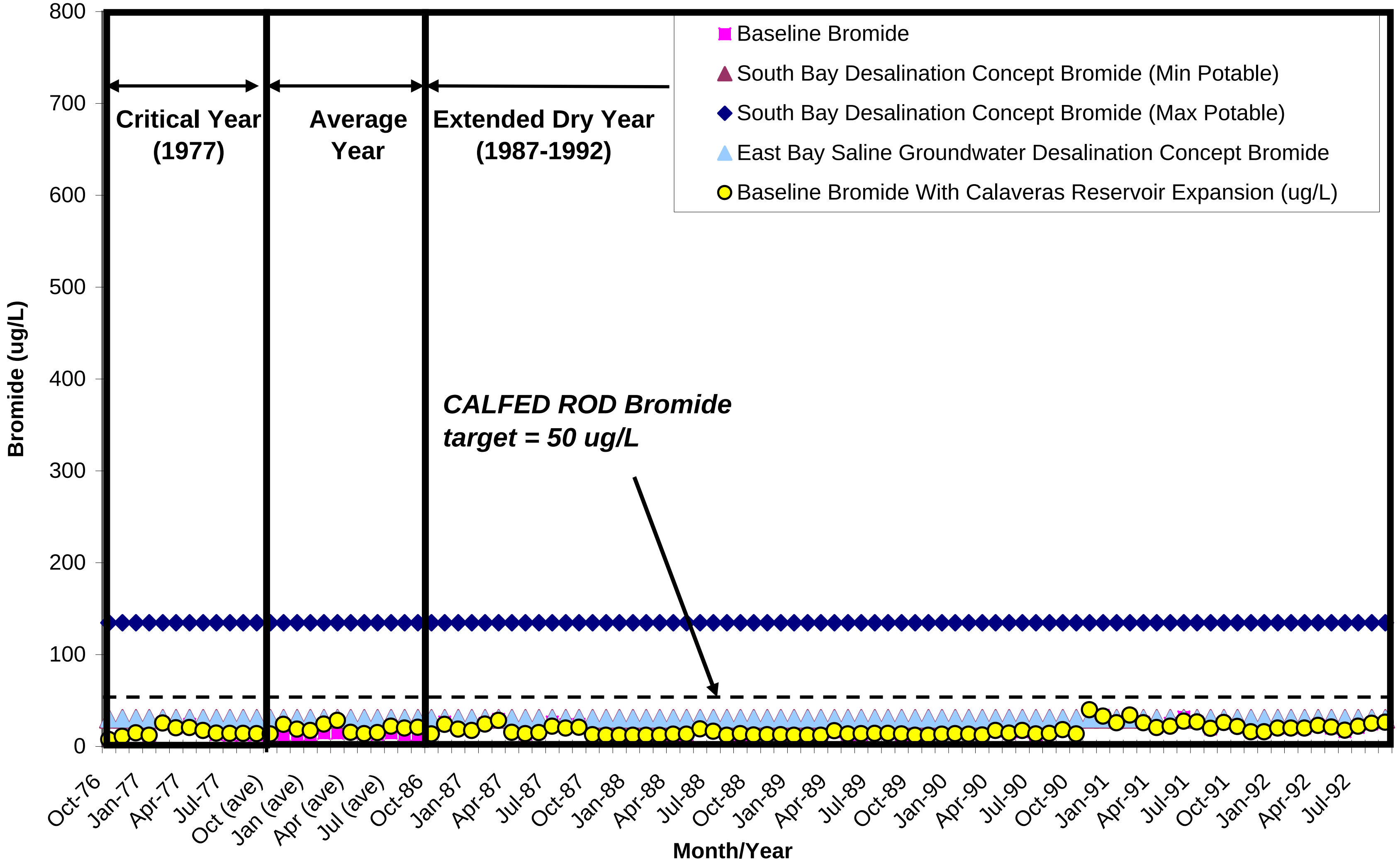


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline bromide with Calaveras Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water Bromide with Concept Bromide

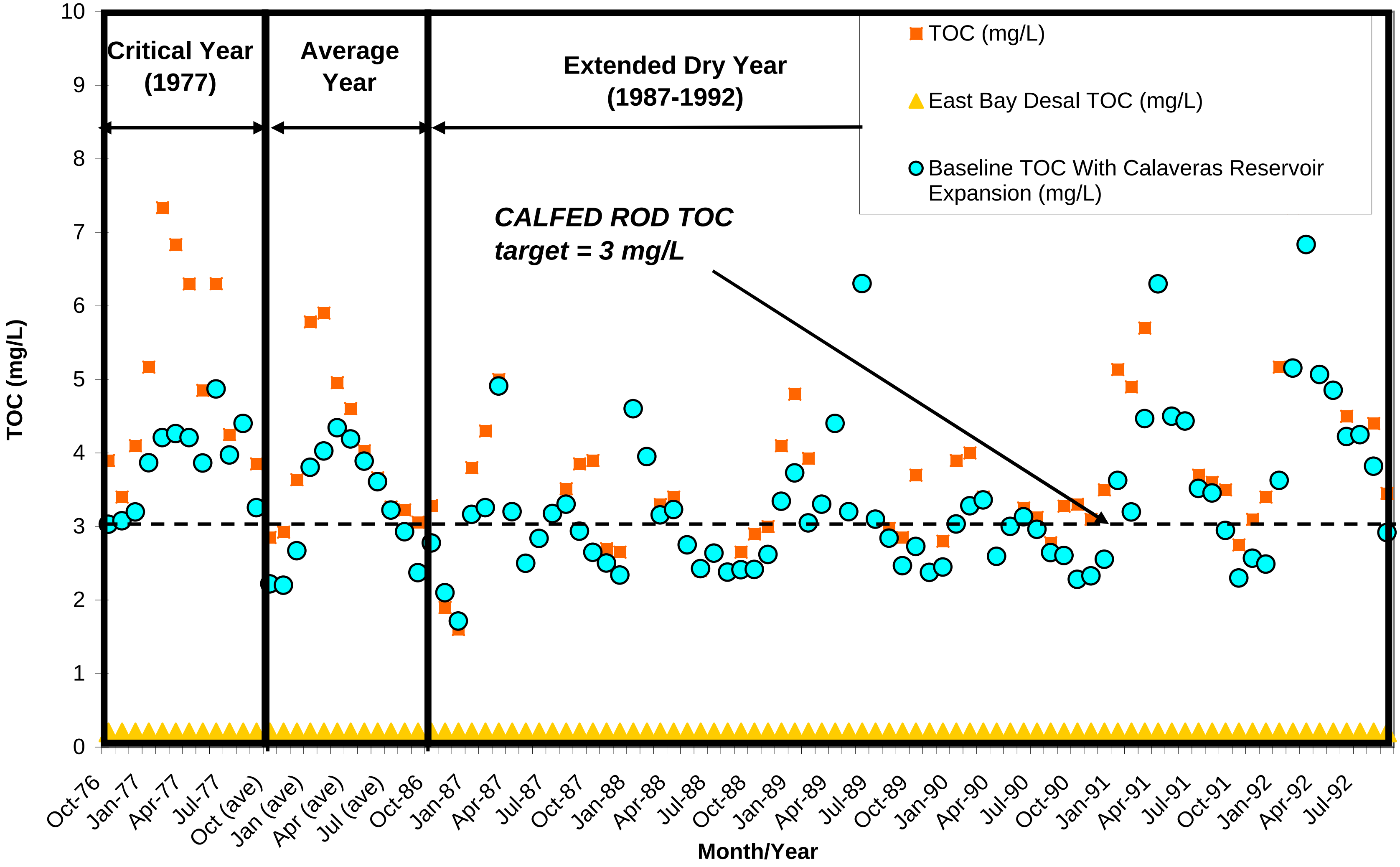


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline bromide with Calaveras is the projected source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TOC with Concept TOC

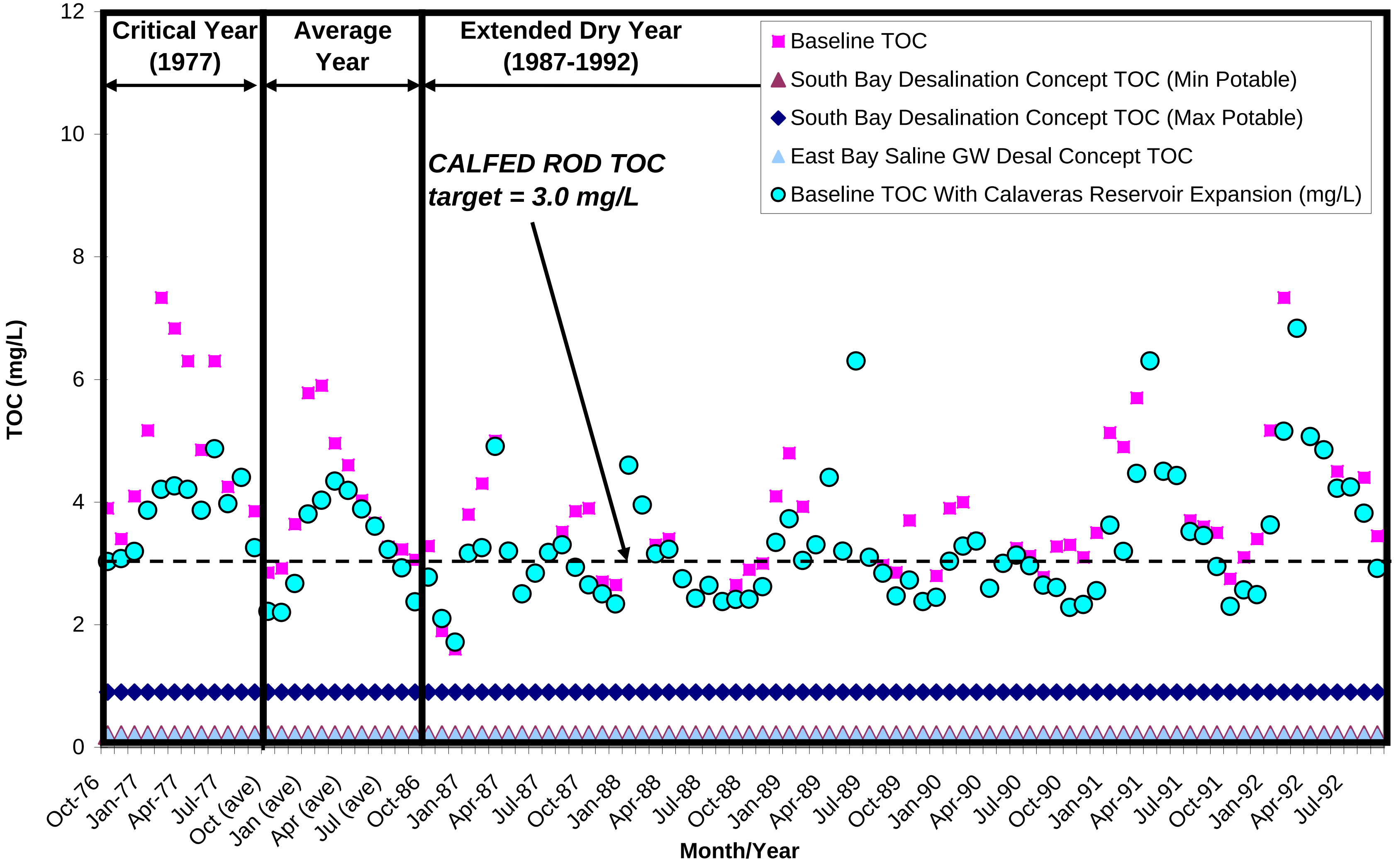


Note: East Bay Desal TOC reflects TOC in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline TOC with Calaveras Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TOC with Concept TOC



Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TOC with Calaveras Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
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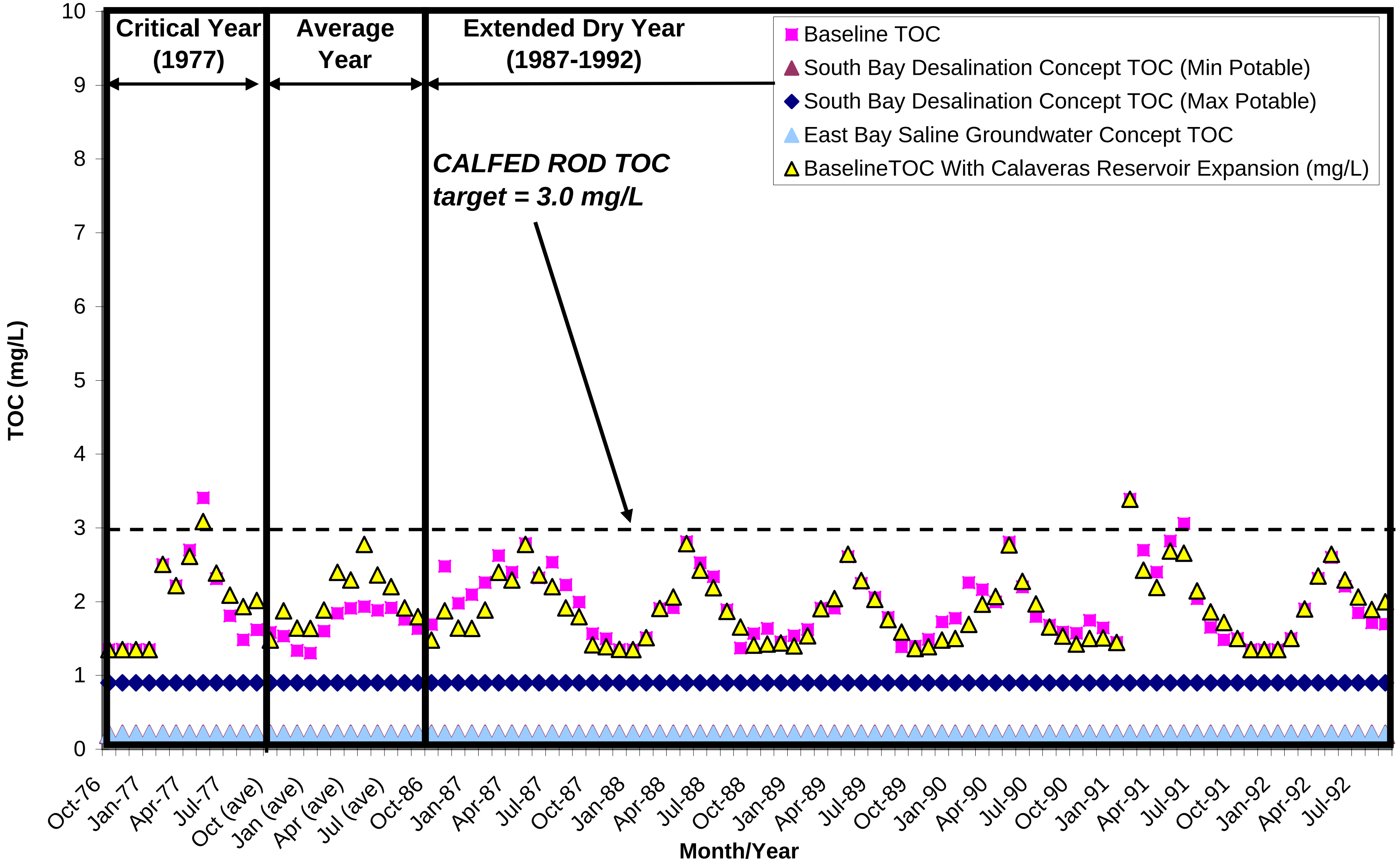
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TOC with Concept TOC

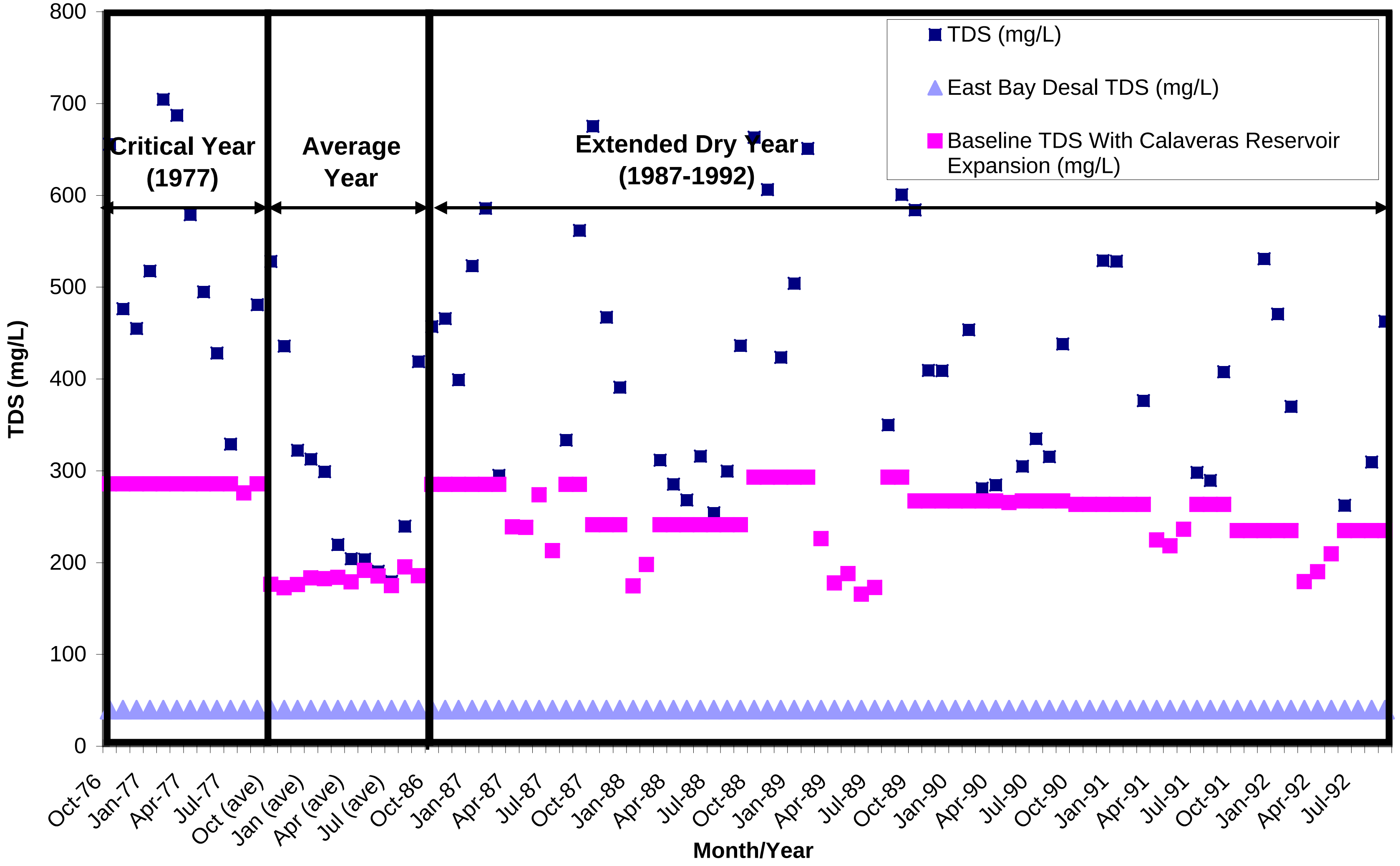


Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline TOC with Calaveras is the projected source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TDS with Concept TDS

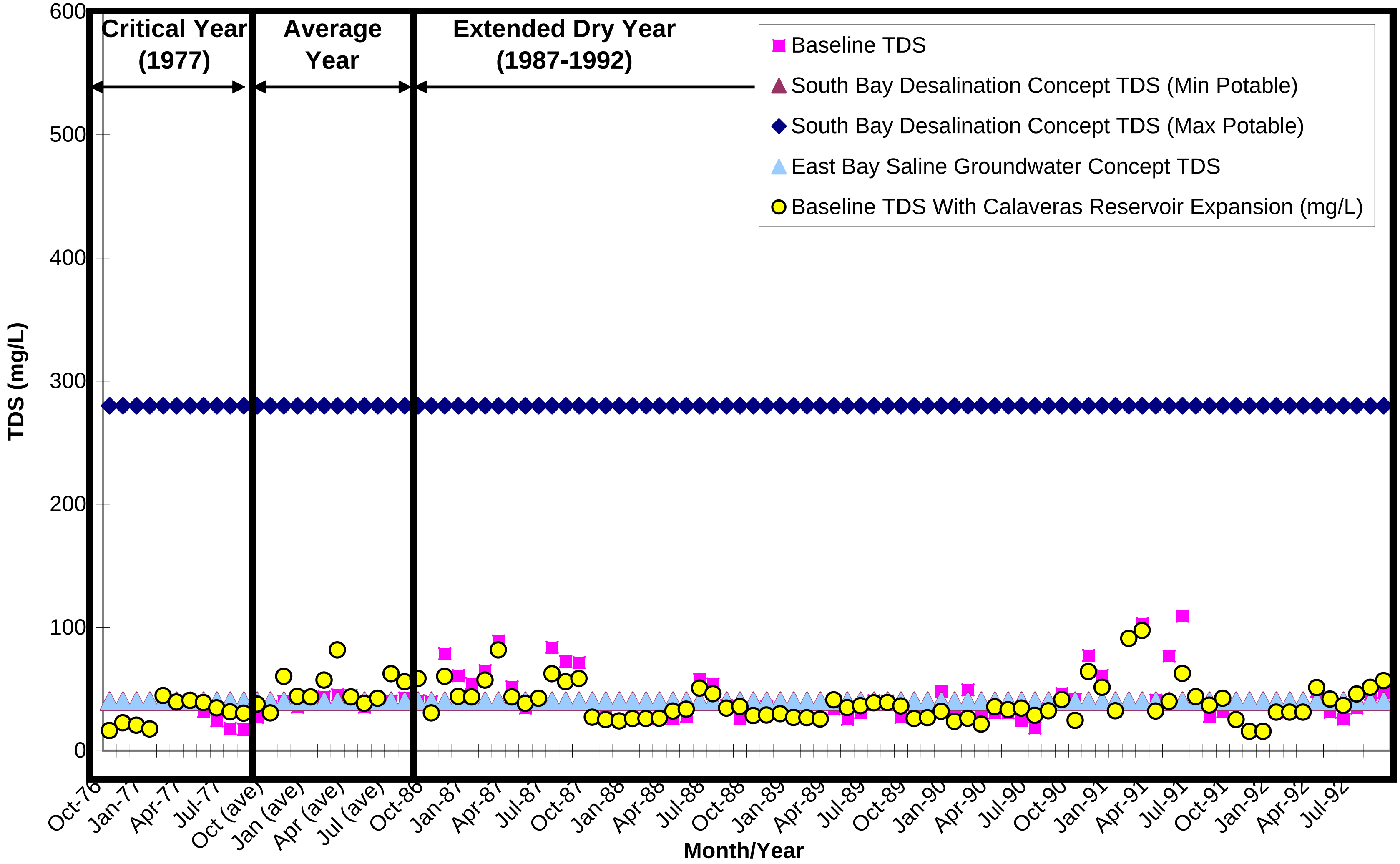


Note: East Bay Desal TDS reflects TDS in pure desalinated supply. This would be blended with ACWD supplies in the distribution system. The baseline TDS with Calaveras Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TDS with Concept TDS

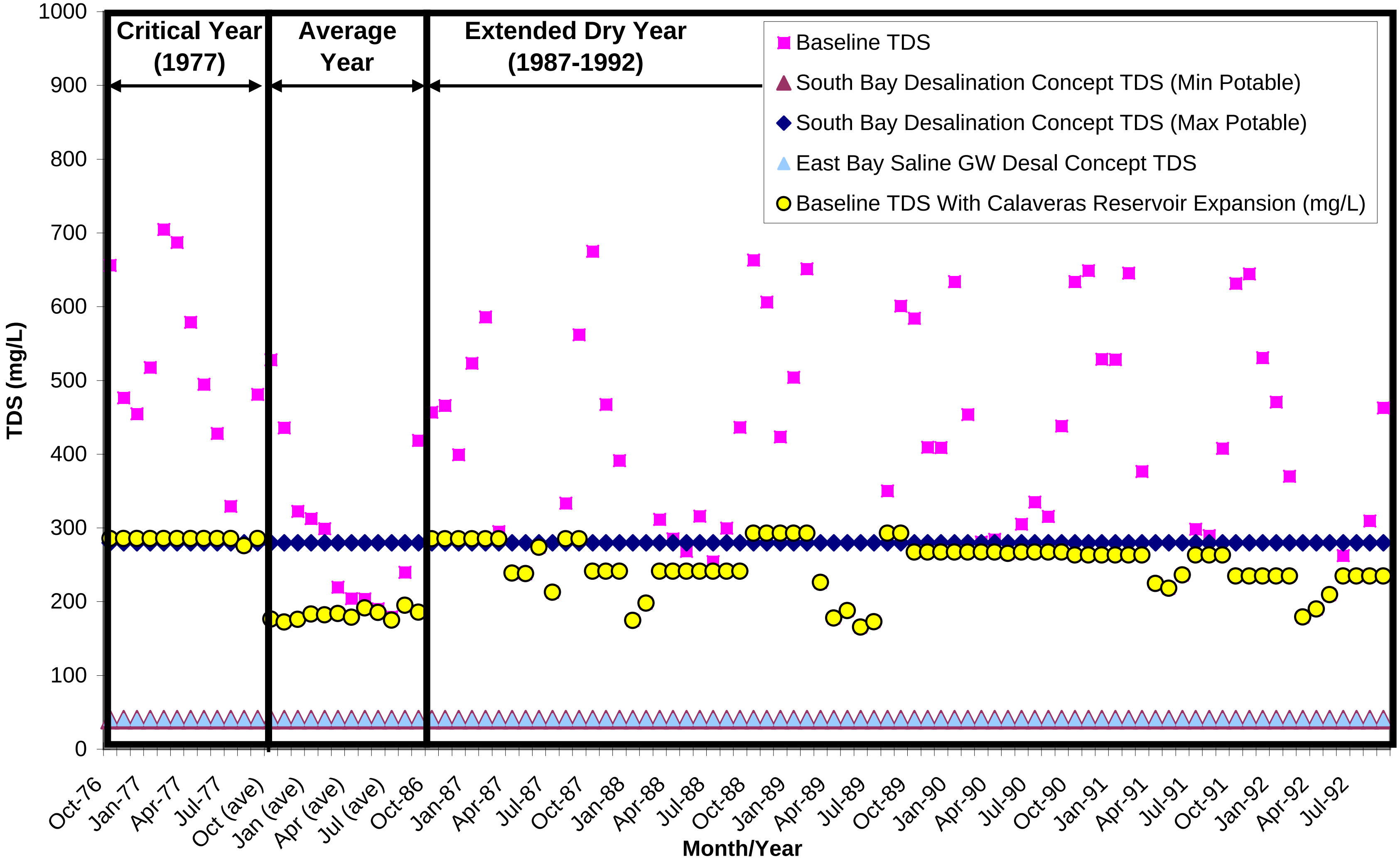


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline TDS with Calaveras is the projected source water quality with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TDS with Concept TDS

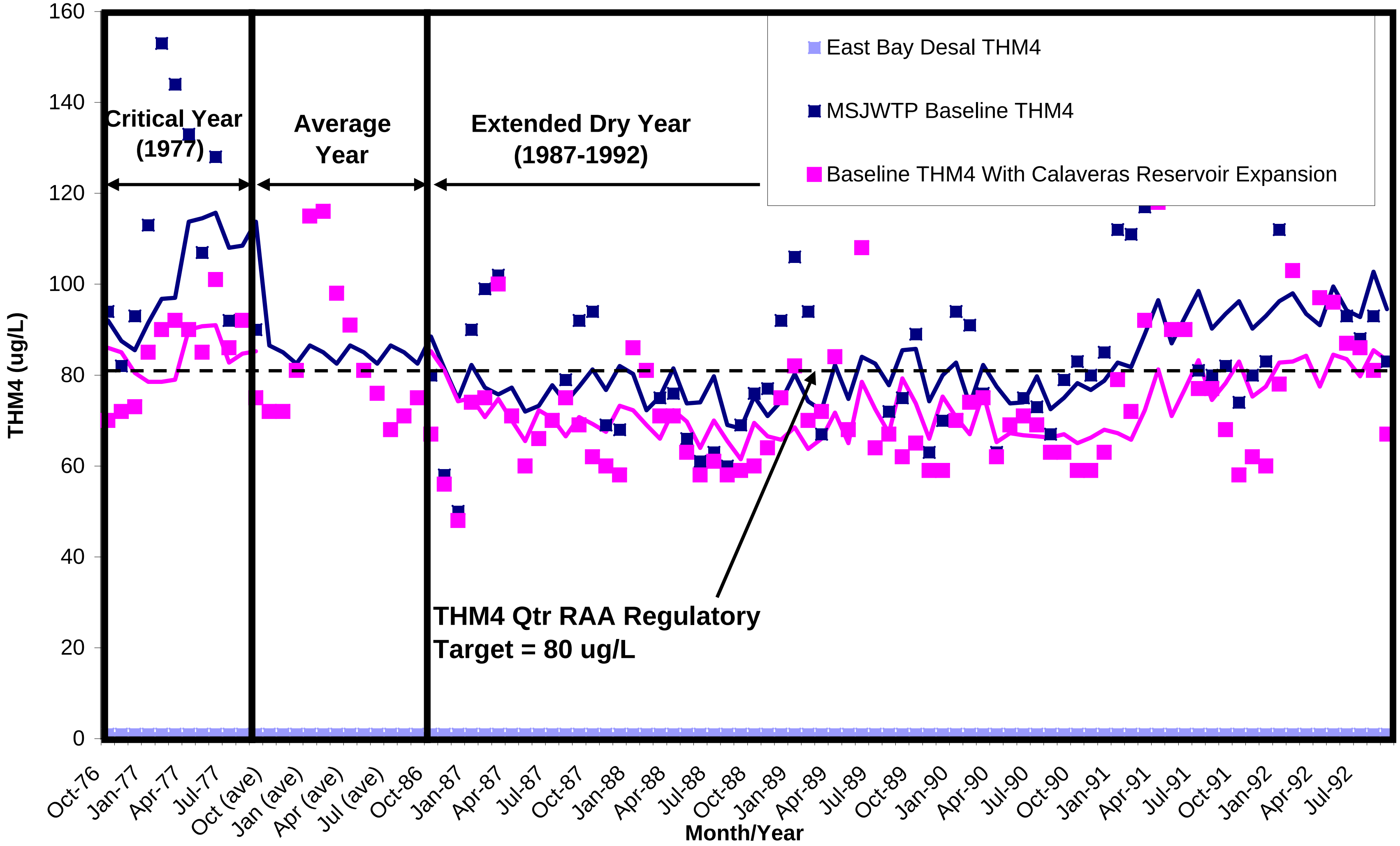


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TDS with Calaveras Reservoir Expansion is the projected blended SBA source water quality with the reservoir expansion

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (MSJWTP)

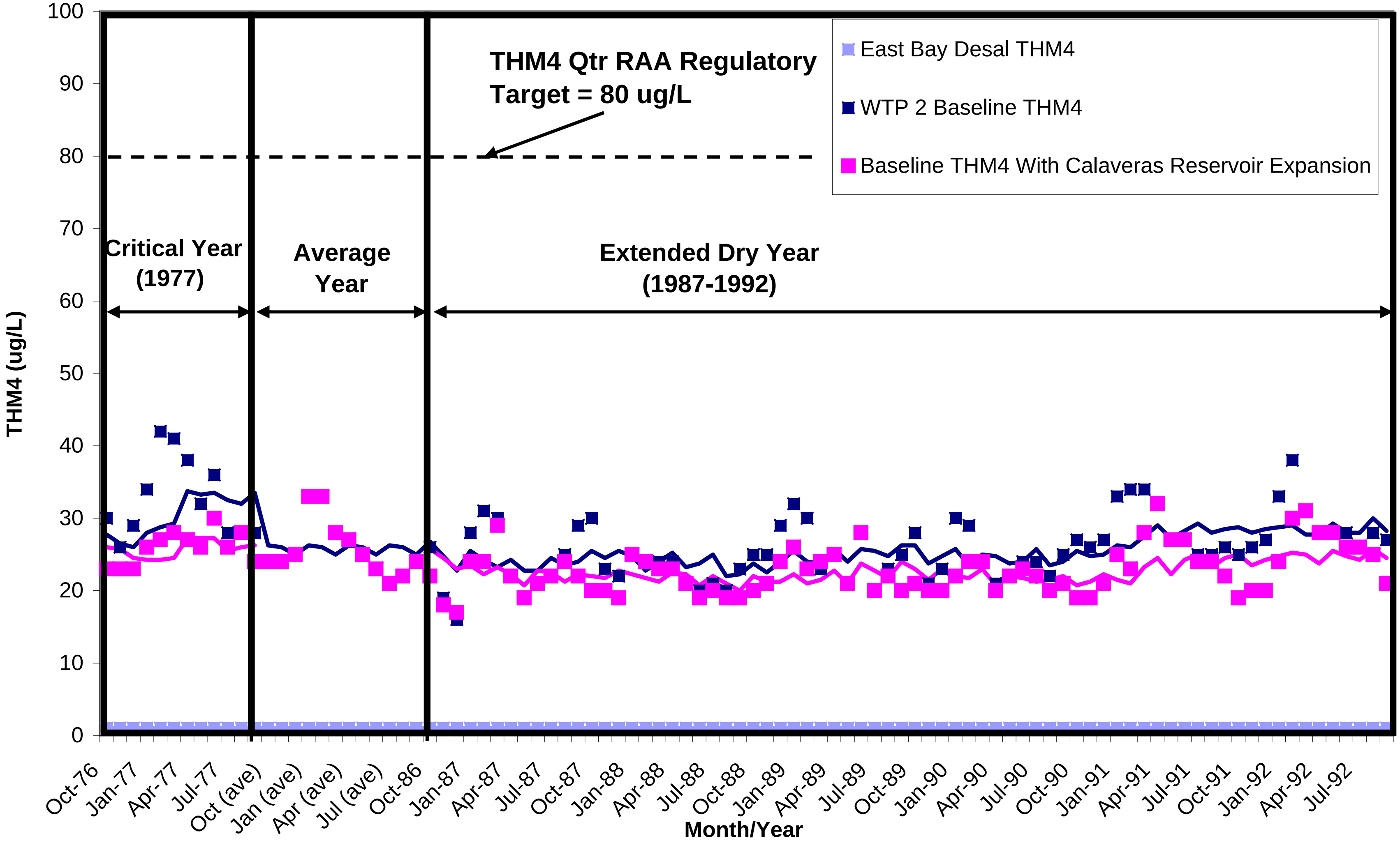


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline THM4 with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for MSJWTP .

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (WTP 2)

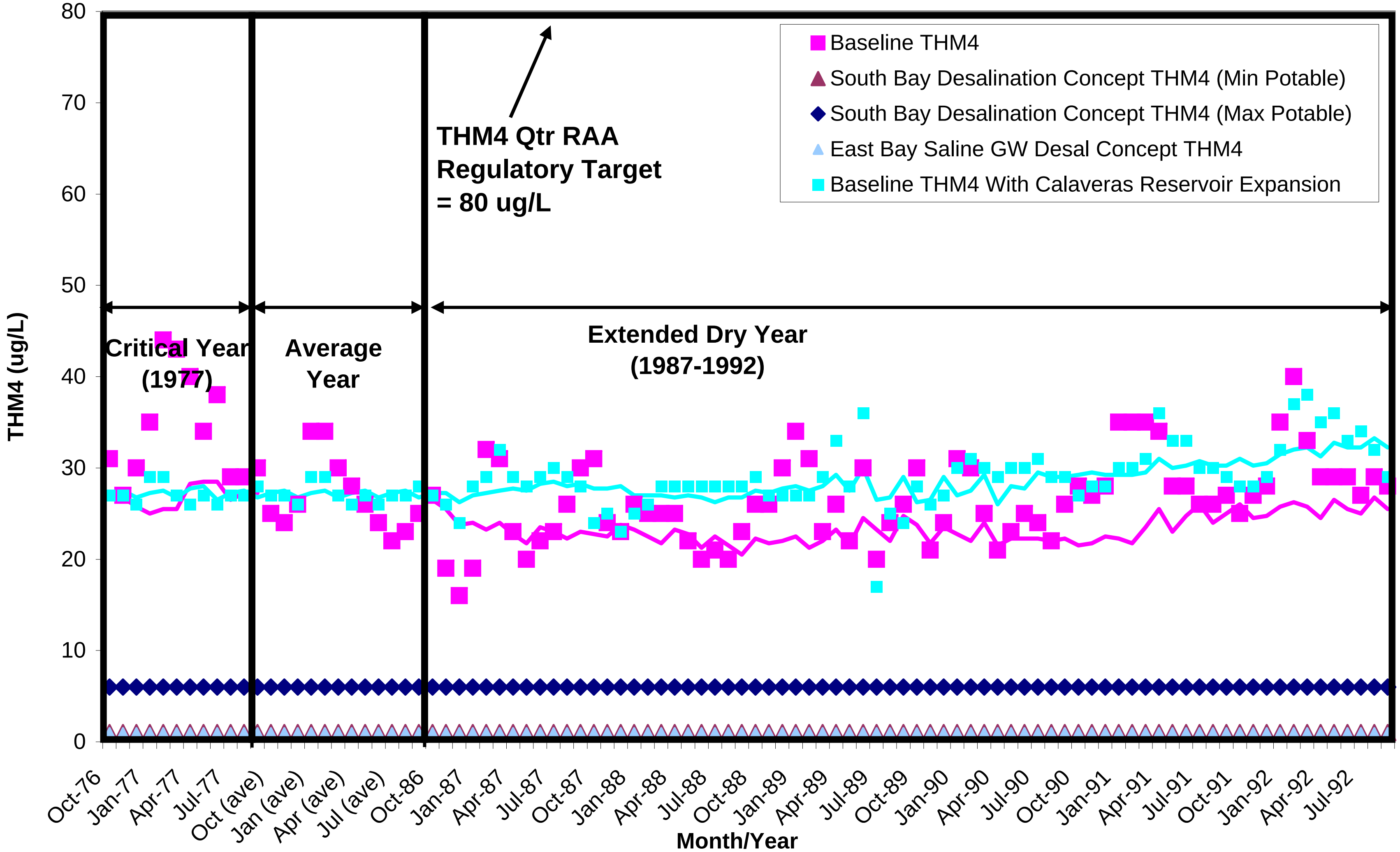


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline THM4 with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline THM4 with Concept THM4

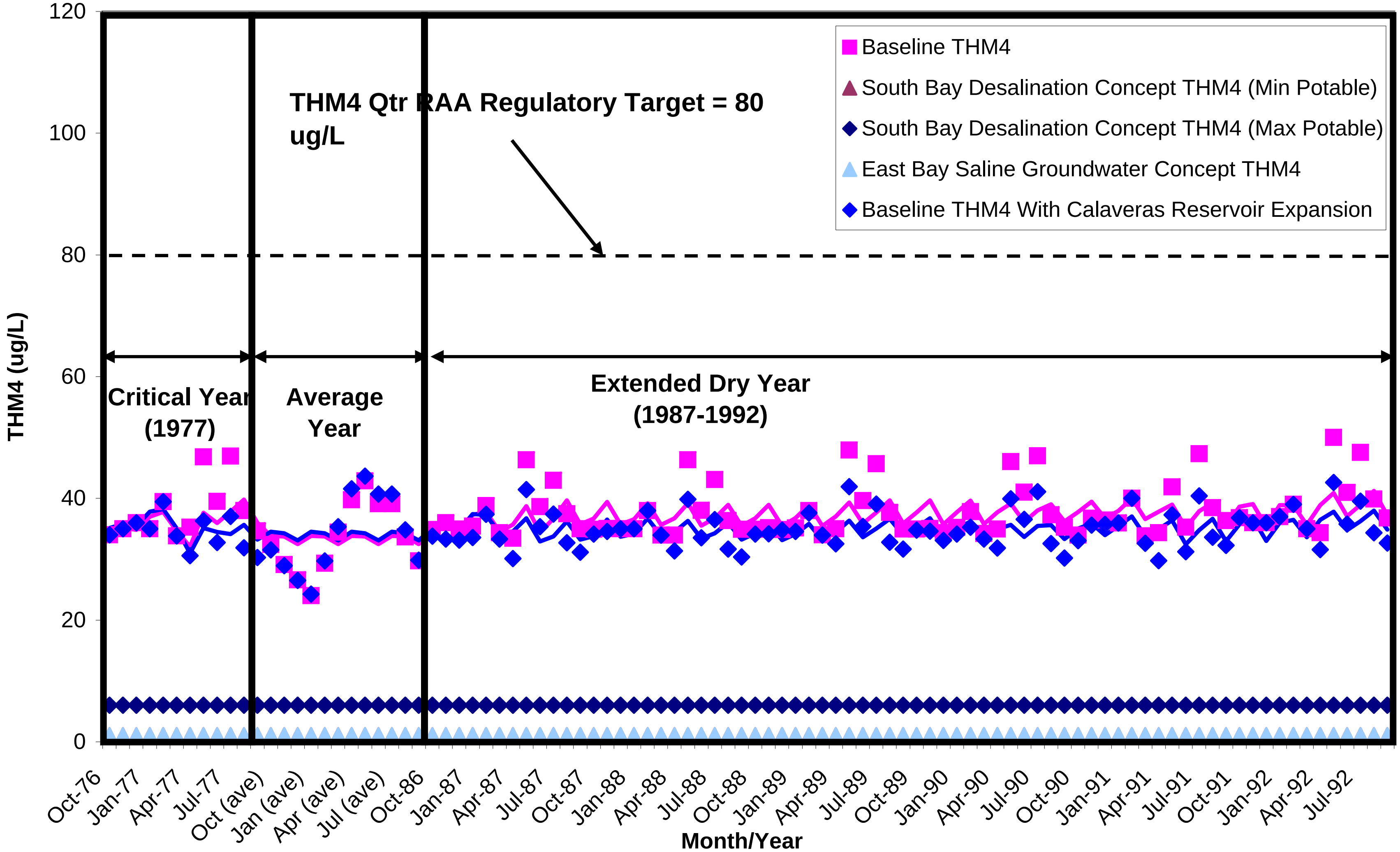


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline THM4 with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated baseline DBP production assumes settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline THM4 with Concept THM4

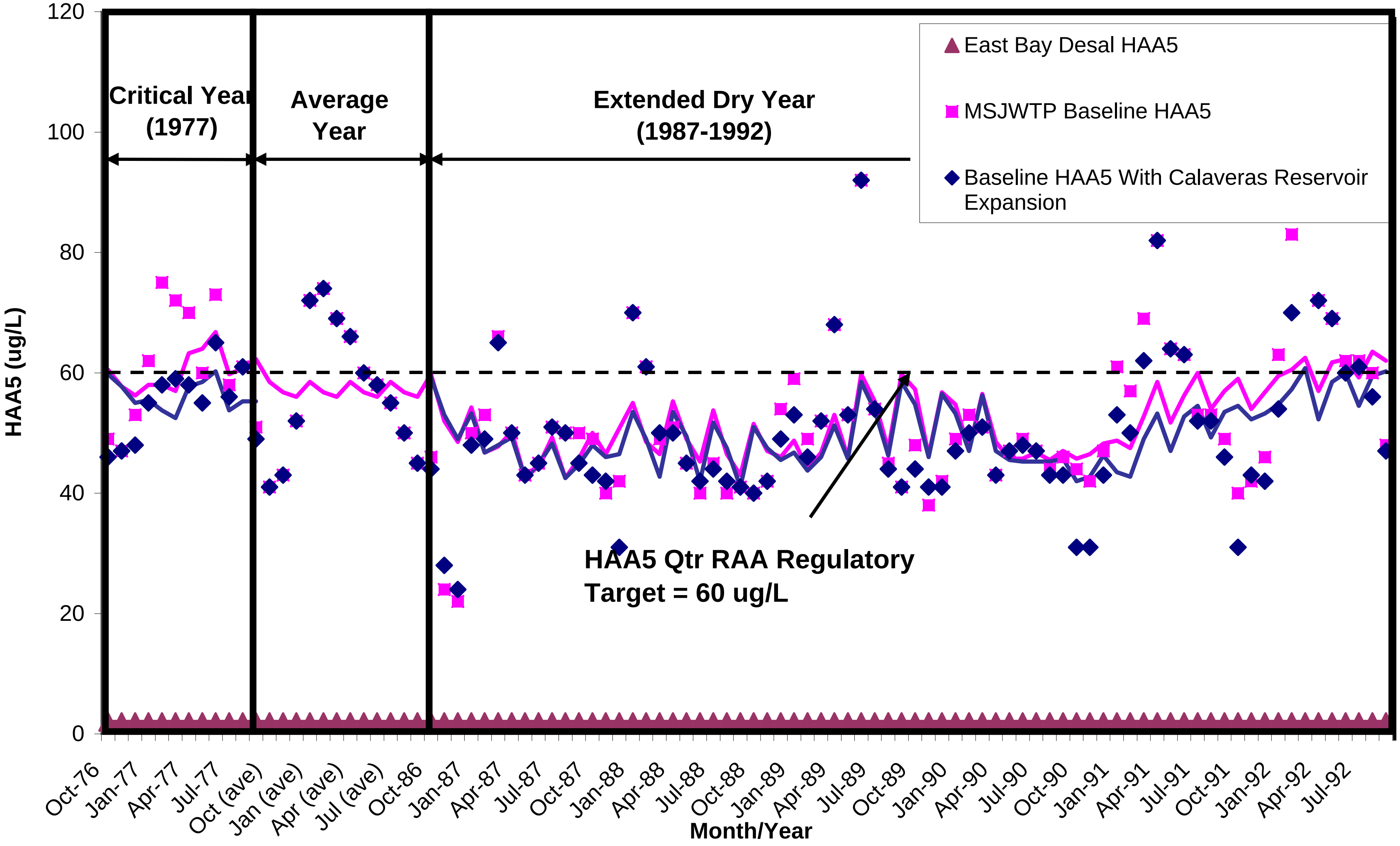


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. The baseline THM4 with Calaveras Reservoir Expansion is the projected blended treated water quality entering the BDPLs with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline HAA5 with Concept HAA5 (MSJWTP)

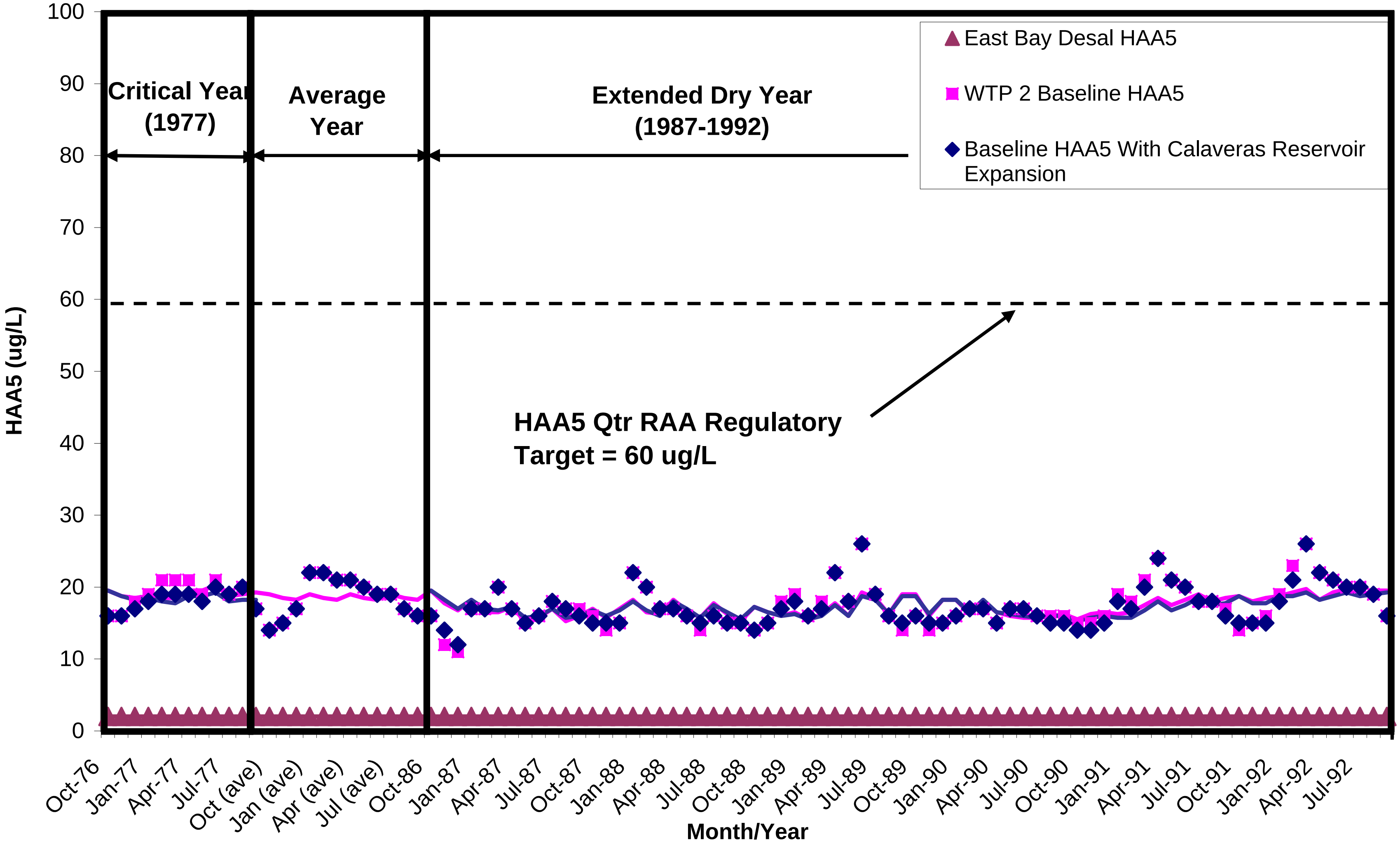


Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline HAA5 with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for MSJWTP.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline HAA5 with Concept HAA5 (WTP 2)

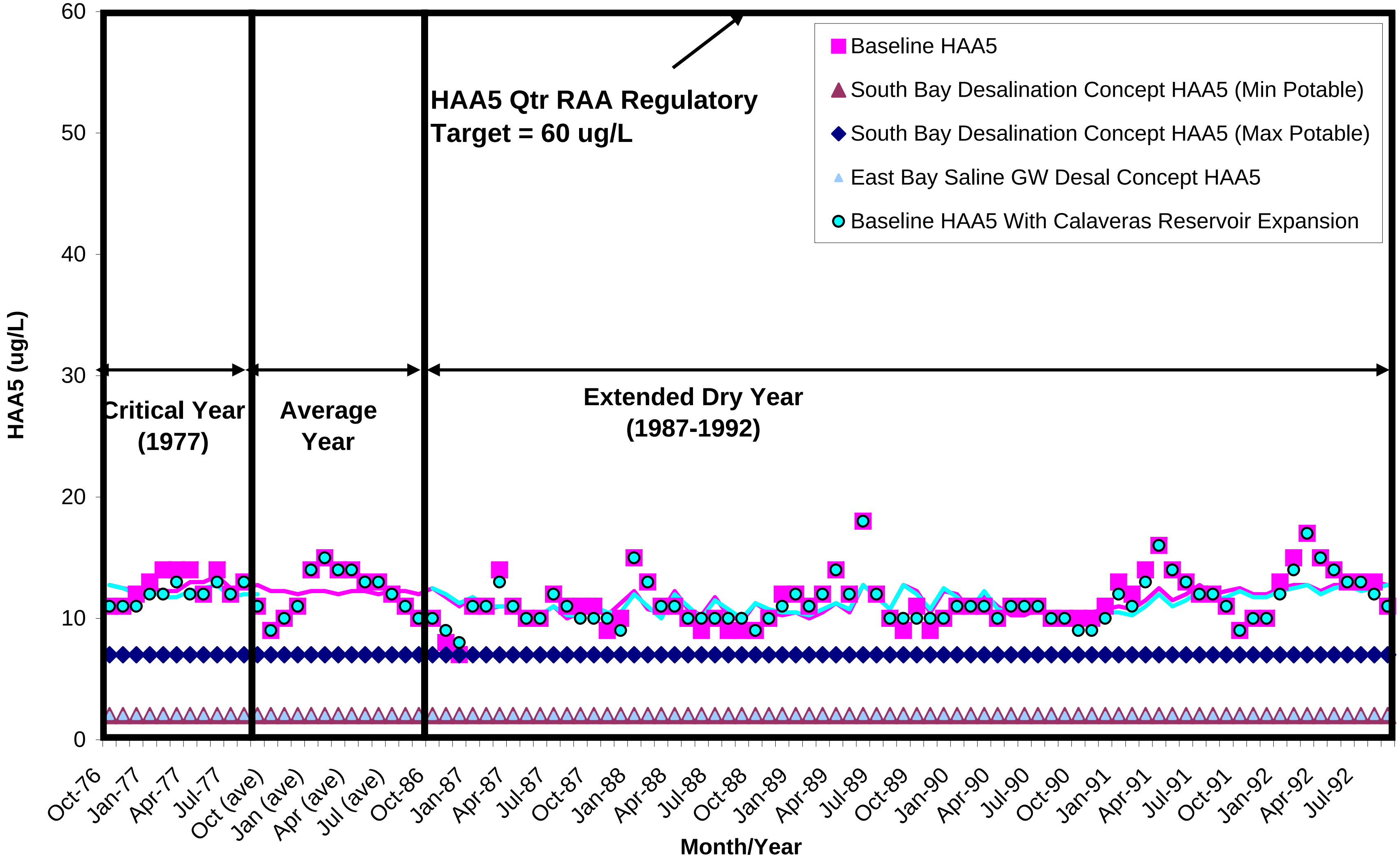


Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. The baseline HAA5 with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for WTP 2.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline HAA5 with Concept HAA5

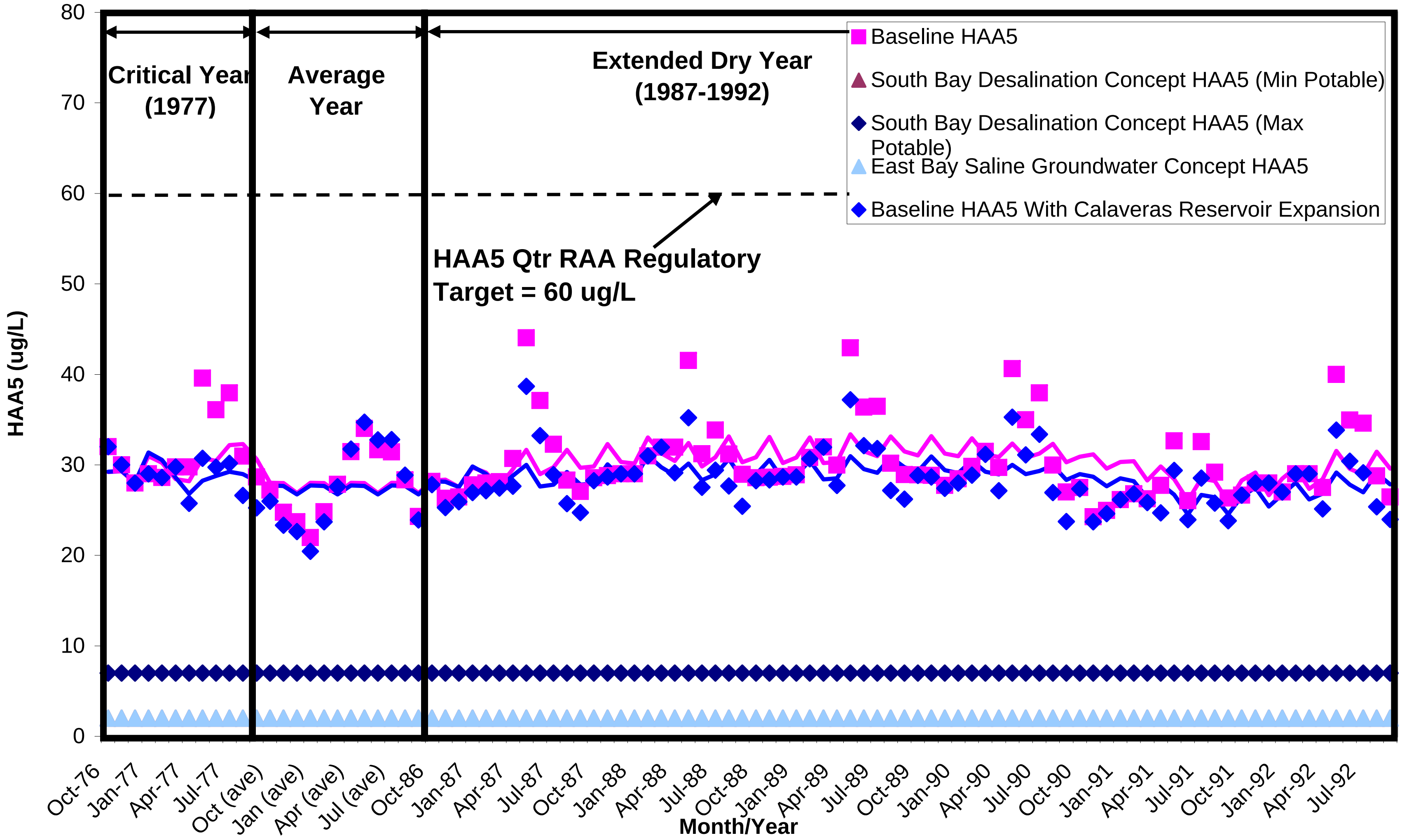


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline HAA5 with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated baseline DBP production for settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline HAA5 with Concept HAA5

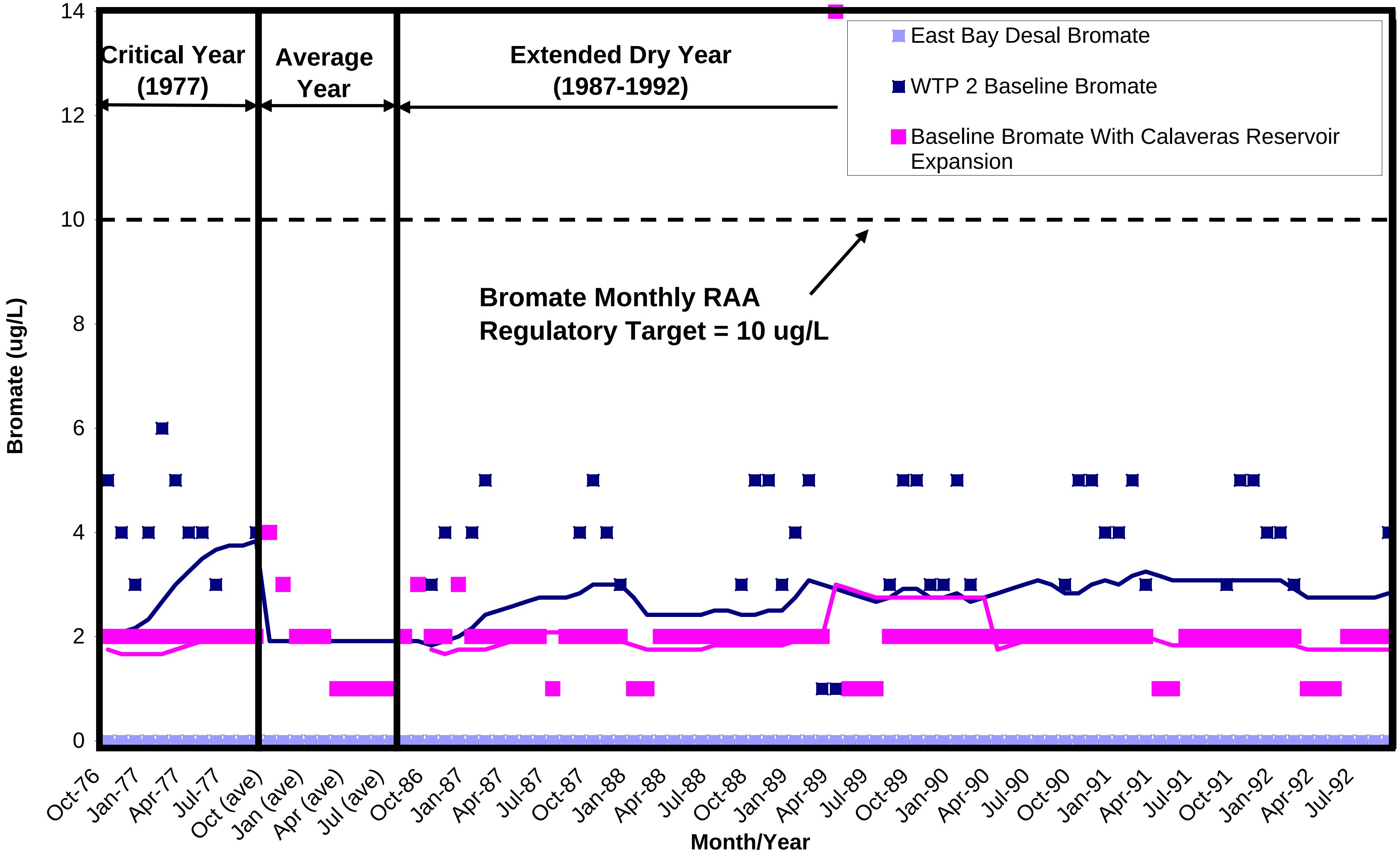


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. The baseline HAA5 with Calaveras Reservoir Expansion is the projected blended treated water quality entering the BDPLs with the reservoir expansion.

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline Bromate with Concept Bromate (WTP 2)

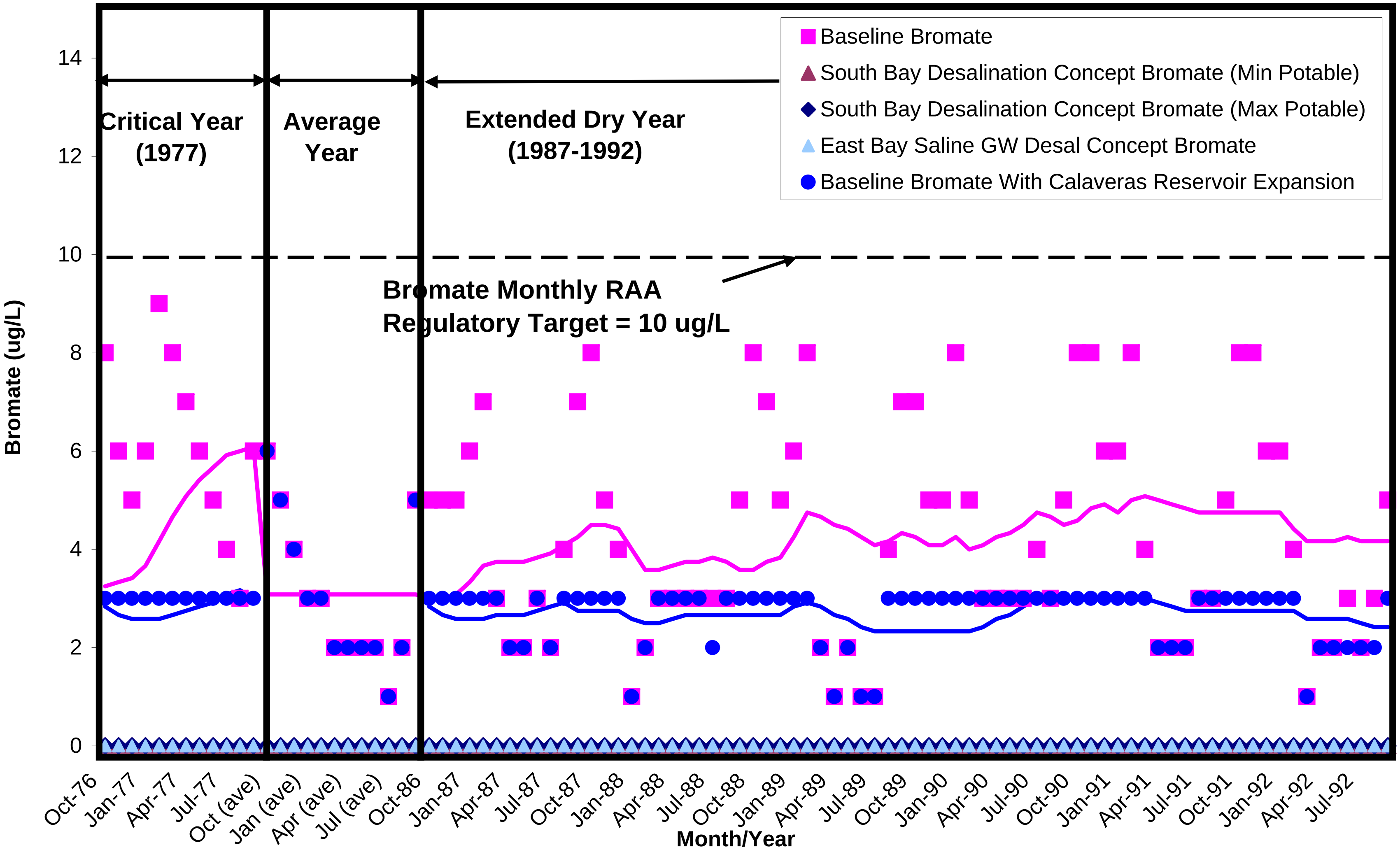


Note: East Bay Desal is not expected to generate detectable concentrations of bromate. The baseline bromate with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability with Calaveras Reservoir Expansion

Concepts Included:
Calaveras Expansion (WS)
RDP
South Bay Desalination
East Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline Bromate with Concept Bromate



Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline bromate with Calaveras Reservoir Expansion is the projected blended SBA treated water quality with the reservoir expansion. Simulated baseline DBP production for settled water ozonation.

G16 Maximize Water Supply Reliability without Storage Portfolio

G16 Example Portfolio: Maximize Water Supply without Storage

DESCRIPTION

The Maximize Water Supply without Storage Example Portfolio includes five concepts: the Regional Desalination Project, South Bay Desalination Concept, East Bay Saline Groundwater Desalination project, Enhanced Conservation, and Water Recycling Concepts. This example portfolio includes all non-storage concepts identified that have dry-year supply reliability benefits.

All seven participating agencies are anticipated to benefit from this portfolio. Additional information on each of the included concepts is provided below.

Maximize Water Supply without Storage Summary

Concepts Included:
- ☐ Regional Desalination Project
- ☐ South Bay Desalination
- ☐ East Bay Saline Groundwater Desalination
- ☐ Enhanced Conservation
- ☐ Water Recycling

Extended Dry Year Supply	Up to 121,000 AFY
Average Year Water Quality Supply	Up to 24,000 AFY

Cost ($2005)

Capital Cost	TBD in future studies
O&M Cost	TBD in future studies
Unit Cost	TBD in future studies

Potential Owning Agency
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC, Zone 7

Potential Partners
ACWD, BAWSCA, CCWD, EBMUD, SCVWD, SFPUC(1), Zone 7

NOTE: Supply quantities exclude RDP and Enhanced Conservation

(1) For the purposes of this study, SFPUC includes retail customers and the 28 wholesale customers, BAWSCA member agencies.

☐ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, that will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are Contra Costa Water District (CCWD), East Bay Municipal Utility District (EBMUD), San Francisco Public Utilities Commission (SFPUC), and Santa Clara Valley Water District (SCVWD). The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all-weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) of product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

☐ *South Bay Desalination Concept*

The South Bay Desalination concept could involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer. The upper aquifer is currently only used for small local domestic or agricultural purposes, or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control plant (WQCP) in Palo Alto. Each of these plants is assumed to have a treated water production capacity of up to 4 MGD. The end use for the desalinated supply could be for non-potable irrigation and industrial use, or for potable use. Two different target supply and water quality ranges have been selected, corresponding to the alternatives for end use. The capacity of 4 MGD is assumed for potable supply. However, due to recycled water supplies available for irrigation and industrial uses, demand for these purposes is lower, and production capacity is assumed to be 1 MGD per plant. This portfolio includes potable supply projects at all three sites, with a potential dry-year supply benefit of 13,000 acre-feet per year (AFY) and an average year water quality benefit of 8,000 AFY. Water quality benefits were only assumed for concepts that could potentially offset SCVWD surface water or groundwater. Potential project beneficiaries include SCVWD, Bay Area Water Supply and Conservation Agency (BAWSCA), and SFPUC.

☐ *East Bay Saline Groundwater Desalination Project*

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD (treated production capacity) desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the saline portion of the Newark Aquifer. Water would be extracted through a series of bay-shore perimeter wells within Alameda County Water District's (ACWD) service district area. Finished water could be pumped directly into ACWD's distribution system or into SFPUC's Bay Division Pipelines 1& 2 in its regional transmission system. Concentrate discharge could potentially be disposed of by delivering it to the East Bay Discharge Authority (EBDA) discharge pipeline, several miles north of the project area, or other options to be identified and evaluated during project planning. This concept has a potential dry-year supply reliability and average year water quality benefit of up to 16,000 AFY. Potential beneficiaries are ACWD (dry-year supply and average year water quality), SFPUC (dry-year supply only for retail and wholesale customers), and SCVWD (details to be developed in future studies).

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-seven water recycling concepts have been carried forward for detailed evaluated in the Bay Area Water Quality and Supply Reliability Program. These recycled water projects will provide up to 92,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 92,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-1 - Supply Reliability Score Card

Performance Measure/Objective	Baseline		Portfolio[1,2]		Baseline Plus Portfolio[1,2]		
	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	Notes/Other
Meet Demands							
Critical Drought							
ACWD Supply	20,600	AFY	Up to 17,650	AFY	Up to 36,600	AFY	BAWSCA, SFPUC, and SCVWD are all listed as beneficiaries for the South Bay Desalination Concepts. Supply allocation has not been performed, and maximum concept yield is displayed for all agencies. SFPUC (retail and wholesale customers, BAWSCA member agencies), SCVWD, EBMUD and CCWD will benefit from the Regional Desalination Project, though supply quantities and allocations are to be determined as part of the RDP. ACWD, BAWSCA, SCVWD (details to be developed in future studies), and SFPUC will benefit from the East Bay Saline Groundwater Desalination facility, though allocations have not been assumed and and maximum concept yield is displayed for both agencies. All participating agencies will benefit from Enhanced Conservation though no yield has been identified for that concept. Because some agencies consider recycled water yield as necessary for meeting baseline demand, potential yields from Recycled Water concepts have been included in the Portfolio Yield column, but not in the Baseline Plus Portfolio column. For Zone 7, no shortfalls have been projected for any hydrology, and yield is assumed to offset SBA supplies, resulting in no net increase in total supply.
BAWSCA Agencies' Supply	137,800	AFY	Up to 65,636	AFY	Up to 167,600	AFY	
CCWD Supply	176,800	AFY	Up to 22,520	AFY	176,800	AFY	
EBMUD Supply	200,430	AFY	Up to 15,366	AFY	200,430	AFY	
SCVWD Supply	39,400	AFY	Up to 49,494	AFY	Up to 69,200	AFY	
SFPUC Supply	157,000	AFY	Up to 84,056	AFY	Up to 186,800	AFY	
Zone 7 Supply (SWP)	38,900	AFY	Up to 6,890	AFY	38,900	AFY	
Total Supply[3]	633,130	AFY	Up to 126,782	AFY	Up to 662,930	AFY	
Extended Drought							
ACWD Supply	25,500	AFY	Up to 17,650	AFY	Up to 41,500	AFY	
BAWSCA Agencies' Supply	209,900	AFY	Up to 65,636	AFY	Up to 239,700	AFY	
CCWD Supply	170,800	AFY	Up to 22,520	AFY	Up to 176,800	AFY	
EBMUD Supply	216,420	AFY	Up to 15,366	AFY	216,420	AFY	
SCVWD Supply	63,000	AFY	Up to 49,494	AFY	Up to 92,800	AFY	
SFPUC Supply	255,000	AFY	Up to 84,056	AFY	Up to 284,800	AFY	
Zone 7 Supply (SWP)	56,400	AFY	Up to 6,890	AFY	56,400	AFY	
Total Supply[3]	787,120	AFY	Up to 126,782	AFY	Up to 816,920	AFY	
Average Year							
ACWD Supply	42,700	AFY	Up to 17,650	AFY	42,700	AFY	
BAWSCA Agencies' Supply	345,000	AFY	Up to 60,136	AFY	345,000	AFY	
CCWD Supply	139,400	AFY	Up to 22,520	AFY	Up to 176,800	AFY	
EBMUD Supply	255,590	AFY	Up to 15,366	AFY	255,590	AFY	
SCVWD Supply	97,800	AFY	Up to 43,994	AFY	97,800	AFY	
SFPUC Supply	329,000	AFY	Up to 54,256	AFY	329,000	AFY	
Zone 7 Supply (SWP)	71,400	AFY	Up to 6,890	AFY	71,400	AFY	
Total Supply[3]	935,890	AFY	Up to 121,282	AFY	Up to 960,190	AFY	
Vulnerability							
ACWD	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - East Bay Saline Groundwater Desalination provides separate connection point to ACWD if South Bay Aqueduct or SFPUC supply were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
BAWSCA Agencies	Delta supply source susceptible to liquefaction of Delta levees. SFPUC source relies on extensive transmission and is susceptible to earthquakes and other catastrophes.		Reduces Vulnerability - South Bay Desalination and potentially the Regional Desalination Project could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply.				
CCWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
EBMUD	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.		Reduces Vulnerability - Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
SCVWD	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - South Bay Desalination concepts could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply, but only a small fraction of SCVWD customers could be served. Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption of imported supply.				
SFPUC	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		Reduces Vulnerability - East Bay Saline Groundwater Desalination could provide small supply source to retail and wholesale customers in the event of a supply disruption on the Hetch Hetchy Aqueduct. Regional Desalination Project could potentially provide additional supply source in the event of a supply disruption on the Hetch Hetchy Aqueduct, though supply quantities and conveyance mechanisms are to be determined by the RDP. South Bay Desalination could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption on the Hetch Hetchy Aqueduct, but only a small fraction of SFPUC customers could be served.				
Zone 7	Delta supply sources susceptible to liquefaction of Delta levees.		No Effect on Vulnerability - Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems.				
Self-Sufficiency within the Region							
Increases Self-Sufficiency within the Region - South Bay Desalination, Regional Desalination Project, East Bay Saline Groundwater Desalination, Water Recycling Concepts and Enhanced Conservation would be locally controlled.							

1. Some agencies include recycled water supplies in future supply projections. As a result, recycled water has not been considered as an additional supply, and does not result in an increased total supply as compared to baseline.
2. Supply quantities and allocations for the Regional Desalination facility(ies) are to be determined by the Regional Desalination Project, and are not included in these numbers.
3. Supply quantities shown for ACWD and SCVWD are SBA supplies only. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply. SFPUC supply quantities include those supplies from the SFPUC regional water system that serve SFPUC retail and wholesale customers (BAWSCA member agency). To avoid double-counting, total supply quantities for the study area were calculated by adding ACWD, CCWD, EBMUD, SFPUC, and SCVWD (excluding supplies to BAWSCA Agencies). BAWSCA agency local sources of supply are not included in the study area total.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-2 - Public Health Protection Scorecard (Page 1 of 2)[1]

Performance Measure/Objective	Portfolio		Baseline Plus Portfolio		Notes
	Source Water	Treated Water	Source Water	Treated Water	
Variability for Treatment					
ACWD	Reduces Variability	NA	NA	NA	East Bay Saline Groundwater Desalination Concept will reduce variability of all parameters. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	NA	NA	NA	BAWSCA agencies receive treated water.
CCWD	TBD^2	NA	TBD^2	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD^2	NA	TBD^2	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD^2	NA	TBD^2	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality. South Bay and East Bay Saline Groundwater Desalination Concepts will reduce variability of all parameters.
SFPUC	TBD^2	NA	TBD^2	NA	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
Zone 7	NA	NA	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality.
Total Dissolved Solids					
ACWD	NA	Reduces TDS	NA	NA	East Bay Saline Groundwater Desalination Concept will reduce TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	Reduces TDS	NA	NA	South Bay and East Bay Saline Groundwater Desalinated supply for potable use will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalinated supplies will be treated to match or improve upon existing TDS. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination will be treated to SFPUC TDS levels, and will have no effect on TDS. South Bay Desalinated supply for potable use will be treated to match or improve upon existing TDS.
Zone 7	NA	NA	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality.
Disinfection By-Products					
ACWD	NA	Reduces DBPs	NA	NA	East Bay Saline Groundwater Desalination Concept will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
BAWSCA Agencies	NA	Reduces DBPs	NA	NA	East Bay Saline Groundwater Desalination and South Bay Desalination supply for potable use will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
CCWD	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. East Bay Saline Groundwater Desalination anf South Bay Desalination supply for potable use will reduce DBPs. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD^2	TBD^2	TBD^2	TBD^2	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination and South Bay Desalination will reduce DBPs.
Zone 7	NA	NA	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality.

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part of the RDP.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-2 - Public Health Protection Scorecard (Page 2 of 2) [1]

Performance Measure/Objective	Portfolio		Baseline Plus Portfolio		Notes
	Source Water	Treated Water	Source Water	Treated Water	
Taste and Odor Problems (Excluding TDS)					
ACWD	NA	Improves T&O	NA	NA	East Bay Saline Groundwater Desalination Concept will improve overall quality and taste and odor.
BAWSCA Agencies	NA	Improves T&O	NA	NA	South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalinated supplies will improve overall water quality and improve taste and odor.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use and East Bay Saline Groundwater Desalinated supplies will improve overall quality and taste and odor. Recycled water projects are assumed to have no benefit or impact to potable water quality.
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination and South Bay Desalination concepts will slightly improve overall quality and taste and odor.
Zone 7	NA	NA	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
ACWD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	NA	NA	East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water quality from known contaminants (e.g., TDS).
BAWSCA Agencies	No Effect on Potential for Degradation	No Effect on Potential for Degradation	NA	NA	South Bay and East Bay Saline Groundwater Desalination and recycled water concepts are not projected to degrade water from known contaminants (e.g., TDS).
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies.
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected. South Bay Desalinated supply for potable use, East Bay Saline Groundwater Desalinated supplies, and recycled water supplies are not projected to degrade water quality from known contaminants (e.g., TDS).
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies. East Bay Saline Groundwater Desalination, South Bay Desalination and recycled water concepts are not projected to degrade water quality from known contaminants (e.g., TDS).
Zone 7	No Effect on Potential for Degradation	No Effect on Potential for Degradation	NA	NA	Recycled water projects are not projected to degrade potable water quality from known contaminants.
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
ACWD	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
BAWSCA Agencies	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with advanced treatment, emerging contaminants including NDMA and pharmaceuticals may be introduced into the groundwater basin due to usage of recycled water. Emerging contaminants such as algal biotoxins may be a factor with desalinated bay and seawater supplies.
CCWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
EBMUD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
SCVWD	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
SFPUC	TBD[2]	TBD[2]	TBD[2]	TBD[2]	
Zone 7	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	Increases Potential for Degradation	

1. Baseline water quality data is detailed in the Water Supply and Water Quality Baseline Technical Memorandum.
2. Effect of Regional Desalination Project Concept on water quality will depend on site(s) selected and supply allocations between agencies, to be determined as part of the RDP.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-2a - Public Health Protection Score Card by Agency

Agency: ACWD[1]

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline			Concept: East Bay Saline Groundwater Desalination		Notes
			ACWD Source Water (SWP)	ACWD Treated Water (MSJWTP)	ACWD Treated Water (WTP 2)	East Bay Saline Groundwater Desal Source Water	East Bay Saline Groundwater Desal Treated Water	
Supply Quantity								
Critical Year		AFY	20,600			16,000		The East Bay Saline Desal concept provides up to 16,000 AFY of treated desalinated water potentially injected into the ACWD distribution system.
Extended Dry Year		AFY	25,500			16,000		
Average Year		AFY	42,700			16,000		
Variability for Treatment								
Critical Year								
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	0.02	
	Mean	mg/L	0.37	0.28	0.33	NA	0.02	
TOC	Range	mg/L	3.4 - 7.3	2.9 - 6.4	2.3 - 5.5	NA	0.1	
	Mean	mg/L	5.1	4.4	3.7	NA	0.1	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	Temperature variations are seasonal
Extended Dry Year								
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.41	0.04 - 0.47	NA	0.02	
	Mean	mg/L	0.26	0.20	0.23	NA	0.02	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	NA	0.1	
	Mean	mg/L	3.7	3.2	2.6	NA	0.1	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	Temperature variations are seasonal
Average Year								
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	0.02	
	Mean	mg/L	0.19	0.14	0.17	NA	0.02	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	0.1	
	Mean	mg/L	3.99	3.43	2.8	NA	0.1	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	Temperature variations are seasonal
Total Dissolved Solids								
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	40	
	Mean	mg/L	507	529	561	NA	40	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	40	
	Mean	mg/L	384	406	438	NA	40	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	40	
	Mean	mg/L	296	319	350	NA	40	
Disinfection Byproducts								
Critical Year								
Bromate	Range	mg/L	NA	ND - ND	2 - 6	NA	ND	
	Mean	mg/L	NA	ND	4	NA	ND	
THM4	Range	mg/L	NA	82 - 153	26 - 42	NA	ND	
	Mean	mg/L	NA	110	33	NA	ND	
HAA5	Range	mg/L	NA	47 - 75	16 - 21	NA	1	
	Mean	mg/L	NA	61	19	NA	1	
Extended Dry Year								
Bromate	Range	mg/L	NA	ND - ND	1 - 5	NA	ND	
	Mean	mg/L	NA	ND	3	NA	ND	
THM4	Range	mg/L	NA	50 - 142	16 - 38	NA	ND	
	Mean	mg/L	NA	83	26	NA	ND	
HAA5	Range	mg/L	NA	22 - 92	11 - 26	NA	1	
	Mean	mg/L	NA	52	17	NA	1	
Average Year								
Bromate	Range	mg/L	NA	ND - ND	1 - 4	NA	ND	
	Mean	mg/L	NA	ND	2	NA	ND	
THM4	Range	mg/L	NA	68 - 116	21 - 33	NA	ND	
	Mean	mg/L	NA	85	26	NA	ND	
HAA5	Range	mg/L	NA	41 - 74	14 - 22	NA	1	
	Mean	mg/L	NA	57	19	NA	1	
Taste and Odor								
Source of water	Qual		NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	

1. East Bay Groundwater Desalination Concept assumes target TDS of 40 mg/L.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-2b - Public Health Protection Score Card by Agency

Agency: SCVWD

			Agency Baseline		**Concept: East Bay Saline Groundwater Desalination[1]**		**Concept: South Bay Desalination (Potable)[2]**		**Concept: South Bay Desalination (Irrigation)[3]**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination (Potable) Treated Water**	**South Bay Desalination (Non-Potable) Source Water**	**South Bay Desalination (Non- Potable) Treated Water**	**Notes**
Supply Quantity											
Critical Year		AFY	39,400		16,000		13,800		3,200		
Extended Dry Year		AFY	63,000		16,000		13,800		3,200		
Average Year		AFY	97,800		16,000		8,300		3,200		
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 -0.53	0.15 -0.48	NA	0.02	NA	0.03 -0.13	NA	0.13 -0.22	
	Mean	mg/L	0.37	0.33	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	3.4 -7.3	2.4 -5.8	NA	0.1	NA	0.2 -0.9	NA	0.9 -1.5	
	Mean	mg/L	5.1	3.9	NA	0.1	NA	0.55	NA	1.20	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 -0.51	0.04 -0.47	NA	0.02	NA	0.03 -0.127	NA	0.13 -0.217	
	Mean	mg/L	0.26	0.24	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	1.6 -7.3	0.9 -5.8	NA	0.1	NA	0.2 -0.9	NA	0.9 -1.5	
	Mean	mg/L	3.7	2.7	NA	0.1	NA	0.55	NA	1.20	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 -0.38	0.07 -0.35	NA	0.02	NA	0.03 -0.127	NA	0.13 -0.217	
	Mean	mg/L	0.19	0.17	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	2.8 -0.0	1.9 -4.6	NA	0.1	NA	0.2 -0.9	NA	0.9 -1.5	
	Mean	mg/L	4.0	3.0	NA	0.1	NA	0.55	NA	1.20	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	less variable	NA	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 -704	296 -724	NA	40	NA	40 -280	NA	290 -500	
	Mean	mg/L	507	527	NA	40	NA	160	NA	395	
Extended Dry Year	Range	mg/L	166 -675	185 -695	NA	40	NA	40 -280	NA	290 -500	
	Mean	mg/L	384	404	NA	40	NA	160	NA	395	
Average Year	Range	mg/L	180 -528	199 -548	NA	40	NA	40 -280	NA	290 -500	
	Mean	mg/L	296	316	NA	40	NA	160	NA	395	
Minimize Disinfection Byproducts											
Critical Year											
Bromate	Range	mg/L	NA	3 -9	NA	ND	NA	ND -ND	NA	ND -ND	
	Mean	mg/L	NA	6	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	27 -44	NA	ND	NA	1 -6	NA	6 -11	
	Mean	mg/L	NA	34	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	11 -14	NA	1	NA	2 -7	NA	7 -11	
	Mean	mg/L	NA	13	NA	1	NA	2	NA	7	
Extended Dry Year											
Bromate	Range	mg/L	NA	1 -8	NA	ND	NA	ND -ND	NA	ND -ND	
	Mean	mg/L	NA	4	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	16 -40	NA	ND	NA	1 -6	NA	6 -11	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	7 -18	NA	1	NA	2 -7	NA	7 -11	
	Mean	mg/L	NA	11	NA	1	NA	2	NA	7	
Average Year											
Bromate	Range	mg/L	NA	1 -6	NA	ND	NA	ND -ND	NA	ND -ND	
	Mean	mg/L	NA	3	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	22 -34	NA	ND	NA	1 -6	NA	6 -11	
	Mean	mg/L	NA	27	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	9 -15	NA	1	NA	2 -7	NA	7 -11	
	Mean	mg/L	NA	12	NA	1	NA	2	NA	7	
Minimize Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	NA	NA	

1. East Bay Groundwater Desalination Concept assumes target TDS of 40 mg/L.

2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

3. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-2c - Public Health Protection Score Card by Agency

Agency: SFPUC

			Agency Baseline		**Concept: East Bay Saline Groundwater Desalination**[1]		**Concept: South Bay Desalination (Potable)**[2]		**Concept: South Bay Desalination (Irrigation)**[3]		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SFPUC Source Water**	**SFPUC Treated Water**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**South Bay Desalination (Potable) Source Water**	**South Bay Desalination (Potable) Treated Water**	**Desalination (Non-Potable) Source Water**	**Desalination (Non-Potable) Treated Water**	**Notes**
Supply Quantity											
Critical Year		AFY	157,000		16,000		13,800		3,200		
Extended Dry Year		AFY	255,000		16,000		13,800		3,200		
Average Year		AFY	329,000		0		0		3,200		
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	
pH	Qual		somewhat	less variable	NA	less variable	NA	less variable	NA	less variable	pH is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	0.6	NA	1.2	
pH	Qual		somewhat	less variable	NA	less variable	NA	less variable	NA	less variable	pH is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.02	NA	0.03 - 0.13	NA	0.13 - 0.22	
	Mean	mg/L	0.01	0.01	NA	0.02	NA	0.08	NA	0.17	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.1	NA	0.2 - 0.9	NA	0.9 - 1.5	
	Mean	mg/L	1.7	1.6	NA	0.1	NA	0.6	NA	1.2	
pH	Qual		somewhat	less variable	NA	less variable	NA	less variable	NA	less variable	pH is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	less variable	NA	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40	NA	40 - 280	NA	290 - 500	
	Mean	mg/L	26	26	NA	40	NA	160	NA	395	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40	NA	40 - 280	NA	290 - 500	
	Mean	mg/L	42	42	NA	40	NA	160	NA	395	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40	NA	40 - 280	NA	290 - 500	
	Mean	mg/L	40	40	NA	40	NA	160	NA	395	
Disinfection Byproducts											
Critical Year											
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	34 - 47	NA	ND	NA	1 - 6	NA	6 - 11	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	28 - 40	NA	1	NA	2 - 7	NA	7 - 11	
	Mean	mg/L	NA	32	NA	1	NA	2	NA	7	
Extended Dry Year											
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	33 - 50	NA	ND	NA	1 - 6	NA	6 - 11	
	Mean	mg/L	NA	38	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	24 - 44	NA	1	NA	2 - 7	NA	7 - 11	
	Mean	mg/L	NA	30	NA	1	NA	2	NA	7	
Average Year											
Bromate	Range	mg/L	NA	ND	NA	ND	NA	ND - ND	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	ND	NA	ND	NA	ND	
THM4	Range	mg/L	NA	24 - 43	NA	ND	NA	1 - 6	NA	6 - 11	
	Mean	mg/L	NA	33	NA	ND	NA	1	NA	6	
HAA5	Range	mg/L	NA	22 - 34	NA	1	NA	2 - 7	NA	7 - 11	
	Mean	mg/L	NA	28	NA	1	NA	2	NA	7	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	NA	

1. East Bay Groundwater Desalination Concept assumes target TDS of 40 mg/L.

2. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

2. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average wate quality for the two targets.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-3 - Cost, Environmental and Implementation Score Card

Performance Measure/Objective	Portfolio Rating	Notes/Other
Cost Impacts		
Total Cost		
Capital Cost	TBD[1]	Regional Desalination Project: Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. East Bay Saline Groundwater Desalination: East Bay Saline Groundwater Desalination facilities are estimated as $75 million ($2005). South Bay Desalination: South Bay Desalination facility capital costs are estimated at $14 to $138 million, and O&M costs at $3 to $10 million ($2005), depending on selected water quality targets. Water Recycling: Recycled water capital costs are estimated as $839 million ($2005). Enhanced Conservation: No cost estimates are available for Enhanced Conservation.
Operating & Maintenance Cost	TBD[1]	
Environmental Mitigation Cost	TBD[1]	
Lifecycle Cost	TBD[1]	
Allocation of Costs	N/A	Allocation of Costs will not be determined as part of this study.
Environmental Impacts[2]		
Overall Impacts to Environment[2]	**Overall Impacts to the Environment (Before Mitigation): TBD[1].** Overall impacts are influenced largely by the RDP in combination with other projects. As potential effects associated with the RDP are not yet determined, the overall impacts for the portfolio is TBD. The level of impact associated with the RDP is not known and would depend on the location and operations of the facilities. In general, if the RDP is sited in an area of sensitive habitat and would require construction and operation of a surface water intake, potential adverse effects would occur (e.g., potential loss of sensitive habitats and entrainment / impingement of aquatic species). In addition, brackish and seawater desalination plants consumes large amount of energy. Depending on the location of other facilities (e.g., recycling plant, conveyance facilities, interties), potential effects to biological resources could occur; however, these facilities would be located in disturbed areas to the extent feasible, thus reducing their potential for adverse impacts. The South Bay Desalination plants would unlikely affect biological resources a they would be located in existing, disturbed areas. **Overall Impacts to the Environment (After Mitigation): TBD[1].** Mitigation opportunities would be developed to reduce potentially high impacts to the environment. For the RDP, these opportunities would depend on the location, but could include the design of the water intake with state-of-the-art screens to reduce entrainment/impingement of aquatic resources, use of energy recovery devices or participation in PG&E voluntary programs to reduce energy consumption, and administration of relevant studies on the potential effects to aquatic resources. In general, mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources for all portfolio facilities include, but are not limited to, alternative siting of facilities to avoid sensitive resources, preconstruction surveys, implementation of standard BMPs, restriction on construction schedule, monitoring, and if necessary, acquisition of regulatory permits and implementation of regulatory permit conditions.	
Overall Benefits to Environment[2]	**Overall Benefits to the Environment (Before Mitigation): TBD[1].** The benefits associated with the RDP would depend on the location and operation of the desalination facilities. any of the concept reduces spring pumping from the Delta (e.g., East Bay Desalination), there would be environmental benefits to the Delta. Reuse of water through water recycling and conservation are considered a benefit to the environment because it reduces demand for new water supplies, and thus construction- and operation-related effects on the environment. **Overall Benefits to the Environment (After Mitigation): No benefits.** No additional benefits are expected after mitigation.	
Implementation Potential		
External Support	TBD[3] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
Ability to Get Outside Funding	TBD[3] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase th likelihood of external funding.	
Consistency with Local and Regional Plans	TBD[3] - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective		
Number of Agencies Receiving Benefits	7	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	6,300,000 people	

1. Assessments and ratings depend on supply quantities, water qualities, site(s) selected, supply allocations, and/or conveyance mechanisms to be determined as part of the RDP.
2. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
3. To be determined in future studies.

Table G16-4 - Environmental Score Card (Page 1 of 2)

Performance Measure/Objective	**Portfolio Rating**
Aquatic Environment	
Potential Impacts to Aquatic Environment	**Effects on Aquatic Environment (Before Mitigation): TBD[1].** Impacts to the aquatic environment are not certain as the location and operations of the RDP have not been determined. Potential long-term, adverse effects to aquatic resources associated with operation of a desalination plant with surface water intake (e.g., entrainment and impingement), and discharge of brine. Brine discharge from the RDP would likely be combined with either wastewater effluent or blow-down water from the power plant; adverse effects would unlikely occur if the combined brine discharge complies with NPDES standards. Operational impacts to aquatic resources are not expected from the East Bay Saline Groundwater and South Bay Desalination concepts, as these facilities would use groundwater as the source water (thus eliminating potential effects to surface aquatic resources). Brine from these facilities would be combined with effluent or power plant blow-down water such that the brine would be mixed and diluted prior to discharge. If the East Bay Desalination supply offsets SBA supply during normal years, there may be a reduction in spring and summer pumping from the Delta and thus benefits to Delta resources. Other minor potential effects on the aquatic environment are associated with improperly treated reclaimed water being discharged into biological sensitive areas (for recycling concepts), and general construction activities that could increase stormwater runoff to nearby creeks and drainages, and thus affect aquatic resources (for all concepts). **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for aquatic resources would depend on the location of the RDP, which could include, but not be limited to, design of the intake with state-of-the-art screens, administration of relevant studies on the potential effects to aquatic resources, acquisition of regulatory permits, and compliance with regulatory permit conditions. General mitigation opportunities to reduce short-term construction effects (for all concepts) include, but are not limited to, implementation of standard BMPs (e.g., sediment and erosion control), and restriction on construction schedule (e.g,. avoid construction activities in creeks during the wet season). Mitigation opportunities to for the potential impacts on sensitive biological resources from operation of recycling facilities include compliance with Title 22 requirements on treatment standards. General mitigation opportunities to reduce short-term construction effects (for all concepts) include, but are not limited to, implementation of standard BMPs (e.g., sediment and erosion control) and restriction on construction schedule (e.g., avoid construction activities in creeks during the wet season).
Terrestrial Environment	
Potential Impacts to Terrestrial Environment (acreage affected)	**Effects on Terrestrial Environment (Before Mitigation): TBD[1].** Impacts to the terrestrial environment from development of all concepts would depend on the location of the facilities. South Bay Desalination treatment facilities would be located on existing, disturbed areas (e.g., power plants or the WQCP) and is not expected to result in adverse effects to terrestrial resources. Where facilities are not known (e.g., RDP, East Bay Saline Groundwater Desalination facilities, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to sensitive terrestrial habitat could occur if facilities are located on these resources. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations. Mitigation opportunities for long-term effects to the terrestrial environment would be avoidance of sensitive terrestrial habitat to the extent possible through alternative siting. In addition, general mitigation opportunities to reduce short-term construction and potentially long-term effects to sensitive resources include, but are not limited to, implementation of standard BMPs (e.g., fence sensitive terrestrial habitats to ensure avoidance), and if necessary, acquisition of regulatory permits and compliance with permit conditions.

1. To be determined in future studies.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Table G16-4 - Environmental Score Card (Page 2 of 2)

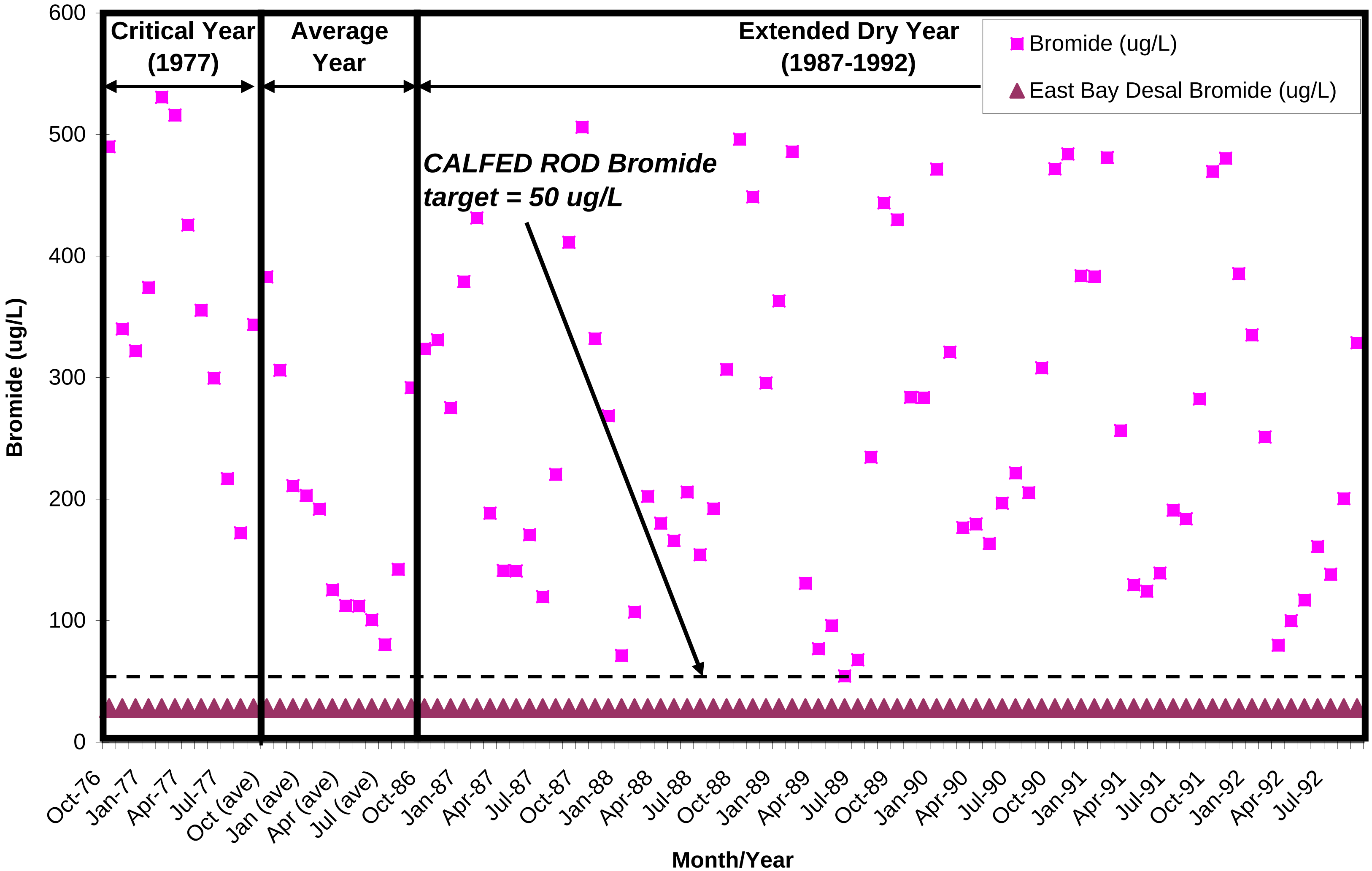
Performance Measure/Objective	Portfolio Rating
Wetlands	
Potential Impacts to Wetland Resources (acreage affected, mitigation)	**Effects on Wetlands (Before Mitigation): TBD[1].** Impacts to wetland resources from facilities development would depend on the location of the individual concept facilities. Although the location of the RDP has not been determined, potential wetlands could be adversely affected if the plant or intake pipelines occur through wetlands. The South Bay Desalination plants would be located within existing, disturbed areas. Recycled water project facilities have not yet been determined but would likely be located in disturbed areas to avoid wetland resources to the extent feasible. A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of conveyance facilities and interties for all concepts may temporarily affect wetland resources (e.g., creek crossing). **Effects on Wetlands (After Mitigation): No Effect. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations.** Mitigation opportunities to reduce adverse effects to wetland resources would be avoidance to the extent possible through alternative siting. If wetlands resources are affected, they would be replaced at a ratio of 3:1 or at a ratio determined through negotiations with regulatory agencies. General mitigation opportunities to reduce short-term construction and potentially long-term effects to wetland resources include, but are not limited to, surveys (e.g., wetlands delineations), implementation of standard BMPs (e.g., installation of silt fence to prevent runoff into wetlands), restriction on construction schedule (limit construction through creeks during dry seasons only), and monitoring.
Special-Status Species	
Potential Impacts to Special-Status Species (number of species)	**Effects on Special-Status Species (Before Mitigation): TBD[1].** Impacts to special-status plant and wildlife species from development of all concepts would depend on the habitat affected, which is determined by the location of the concept facilities. As described above, the location of the RDP has not been determined; potential effects may occur to special-status fisheries or other plant and wildlife species from construction and operation of the RDP desalination plant. The South Bay Desalination plants would be located in disturbed areas (e.g., power plant, WQCP), and effects to special-status species are unlikely. Where facilities are not known (e.g., East Bay Saline Groundwater Desalination plant, recycling facilities, interties, and conveyance facilities for all concepts), potential effects to special-status species could occur if facilities are located within or adjacent to habitat for these species. However, to the extent feasible, facilities would be sited within disturbed areas or along road rights-of-way. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities for effects to special-status species would be avoidance of sensitive habitats to the extent possible, or acquisition of regulatory permits and implementation of regulatory permit conditions if impacts occur. Mitigation opportunities for the RDP have not been identified; they would be determined based on the RDP's location and operations. In addition, general mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., construction during non-nesting or -breeding season).
Energy Consumption	
Potential Increases in Energy Consumption (amount of energy required for operation)	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** All facilities would consume energy. Pollutant emissions would be associated with energy production. Due to the size and energy requirement of the RDP, it would result in the most energy consumption.
Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	**Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** The energy requirement for the RDP could be reduced with implementation of energy recovery devices. Participating agencies could enroll in voluntary PG&E Demand Response Programs to reduce demand on the electrical system during peak consumption periods. However, the total amount of energy consumed and pollutants emitted would still be considered an increase.

1. To be determined in future studies.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water Bromide with Concept Bromide

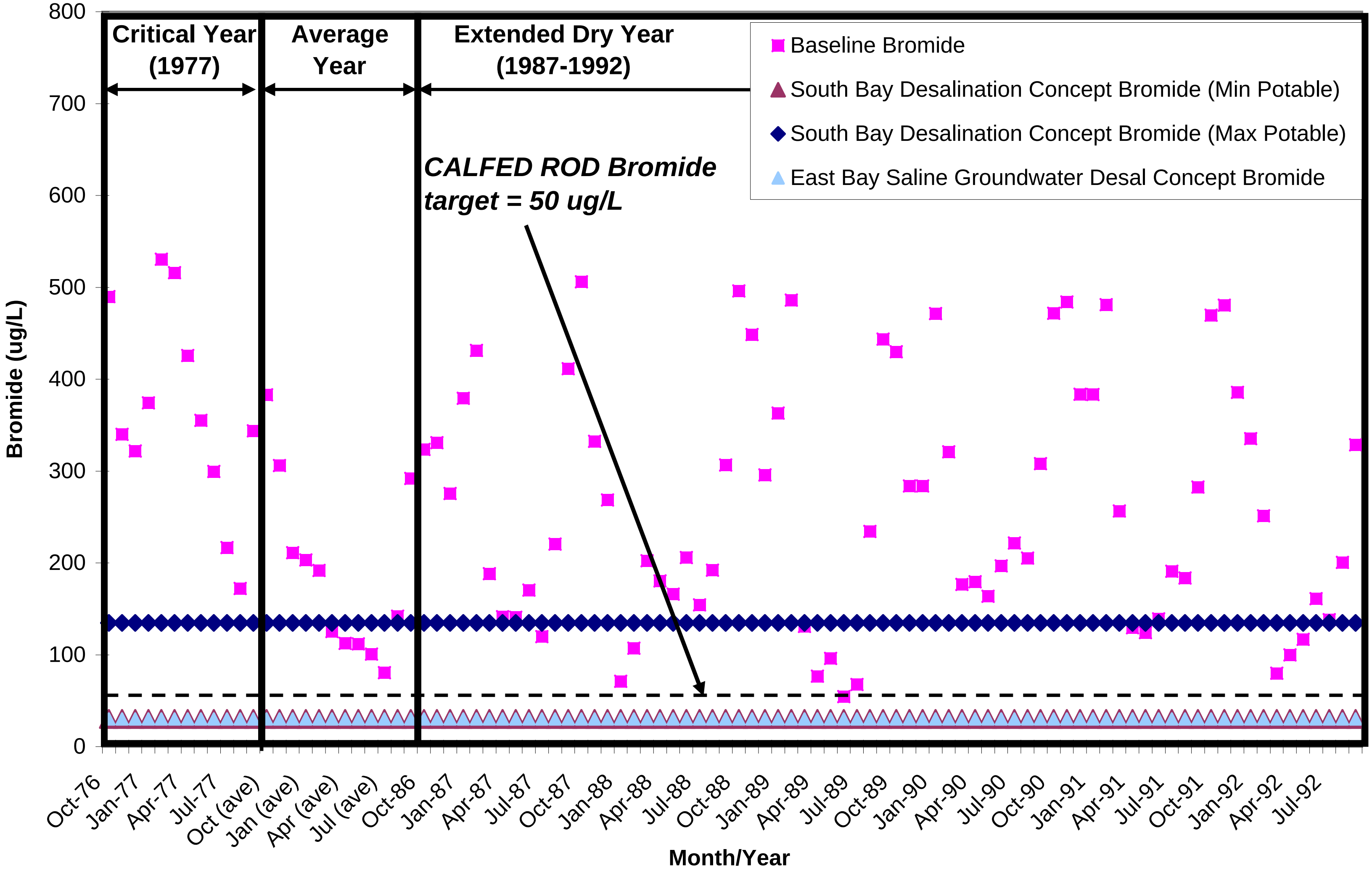


Note: East Bay Desal Bromide reflects bromide in pure desalinated supply. This will be blended with ACWD supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water Bromide with Concept Bromide

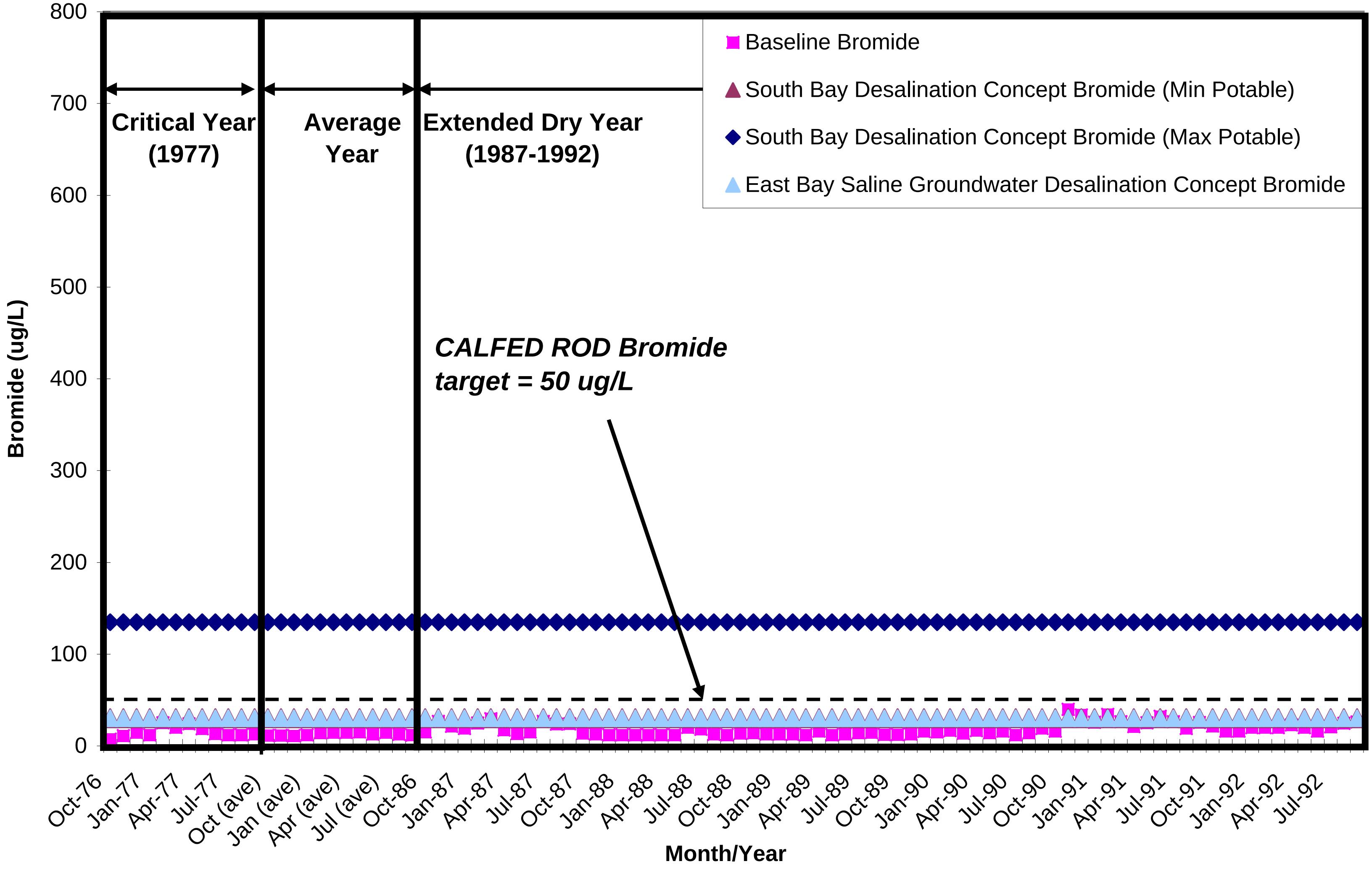


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water Bromide with Concept Bromide

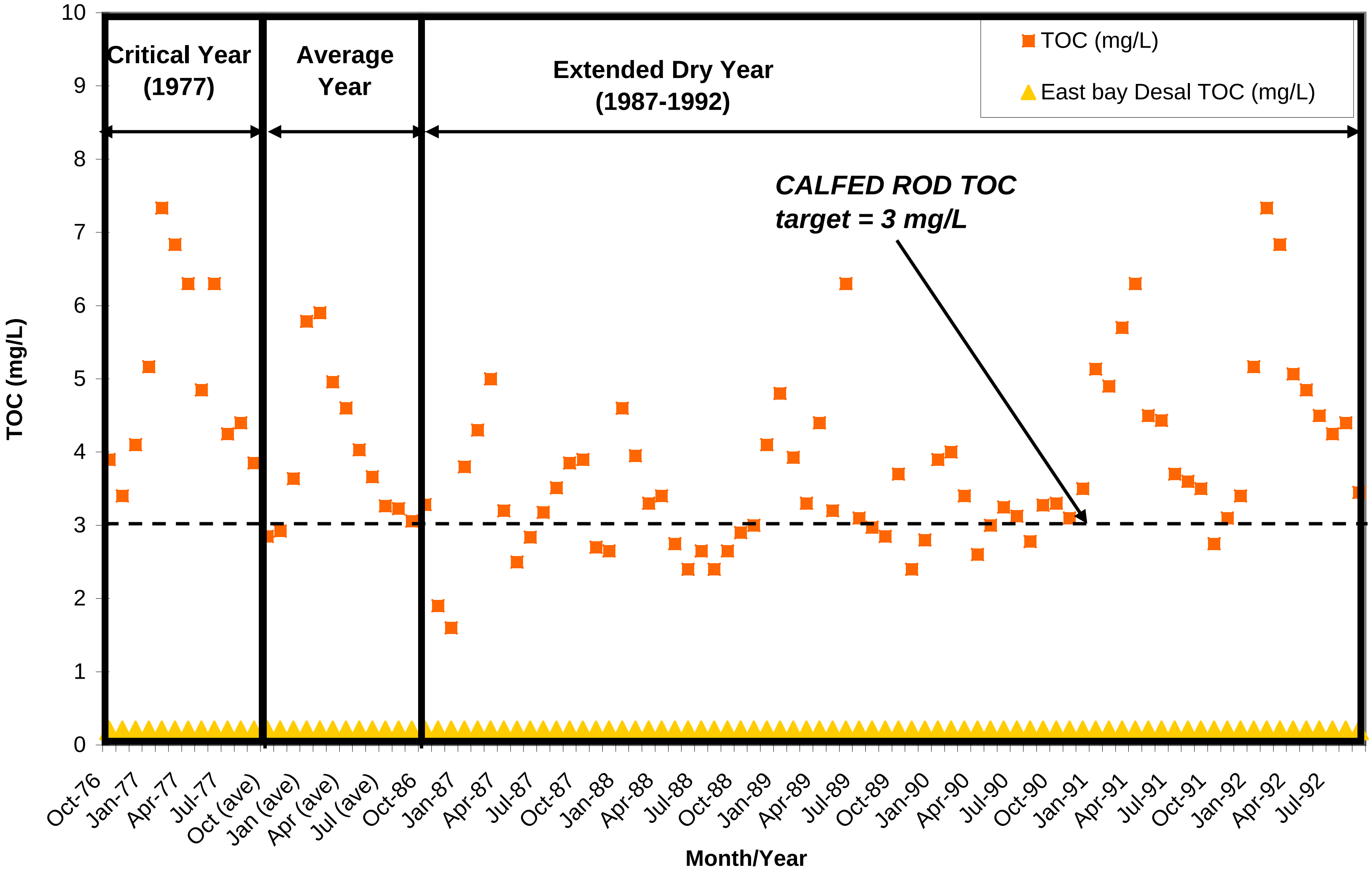


Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TOC with Concept TOC

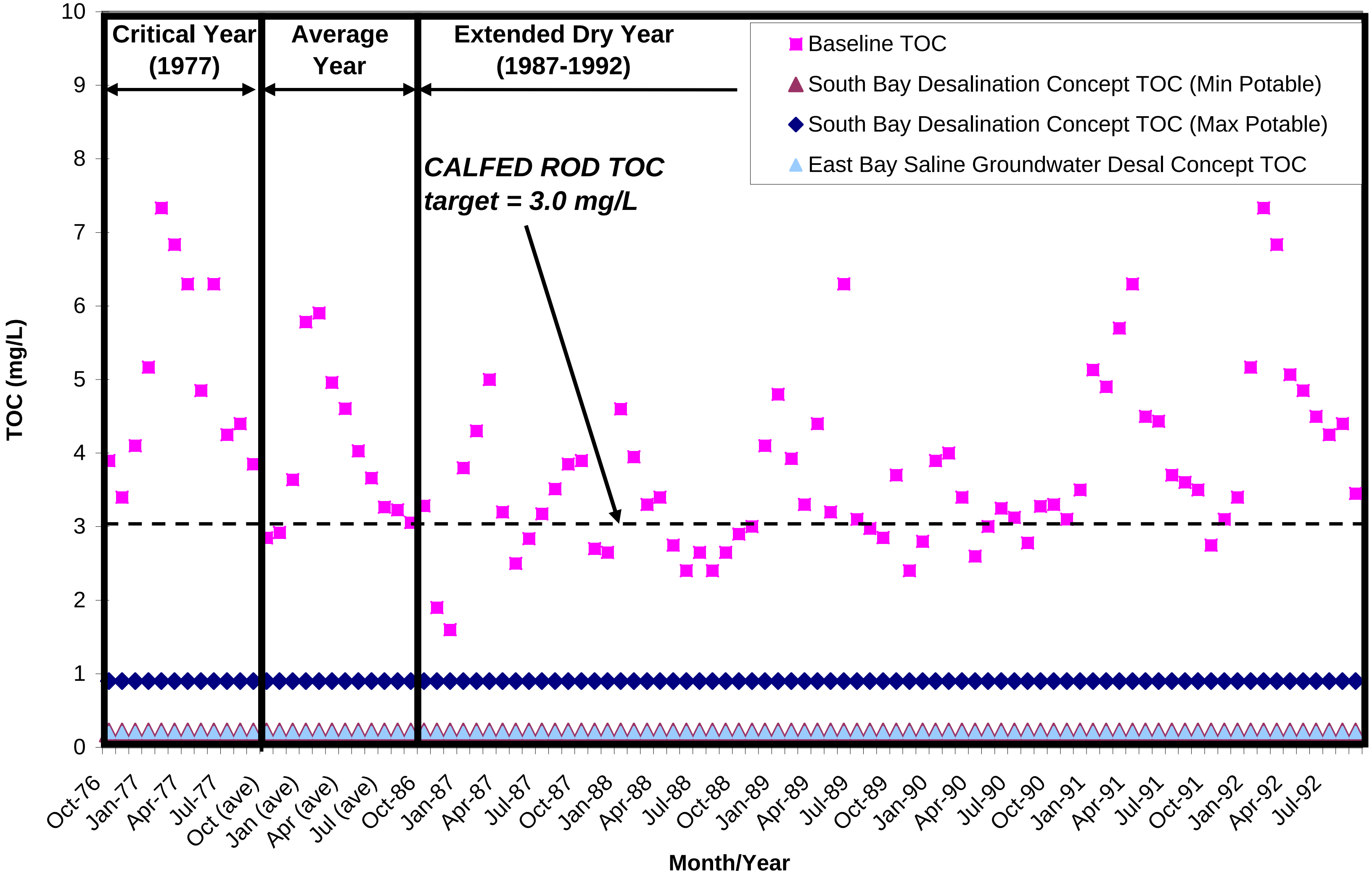


Note: East Bay Desal TOC reflects TOC in pure desalinated supply. This will be blended with ACWD supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TOC with Concept TOC

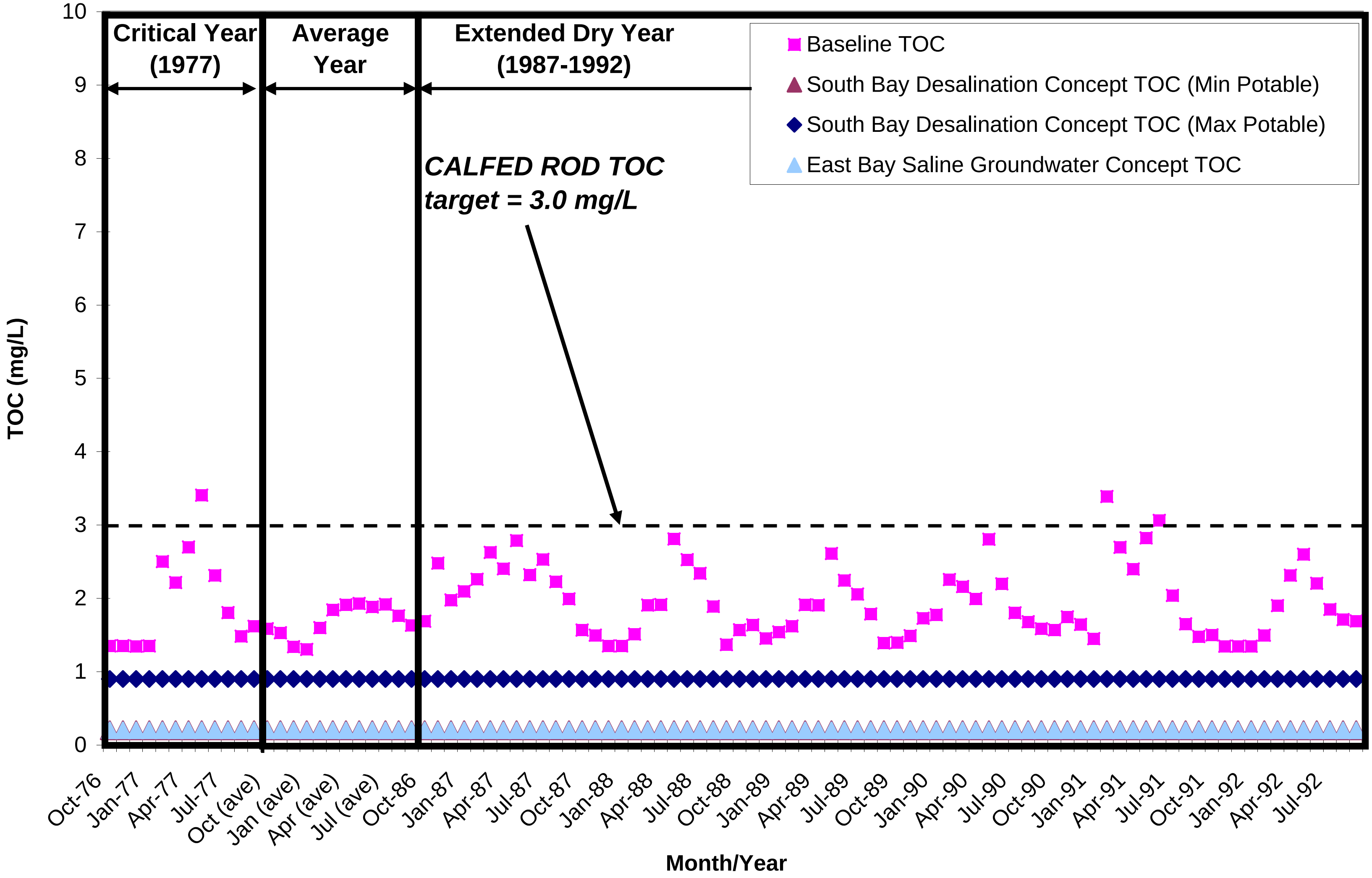


Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TOC with Concept TOC

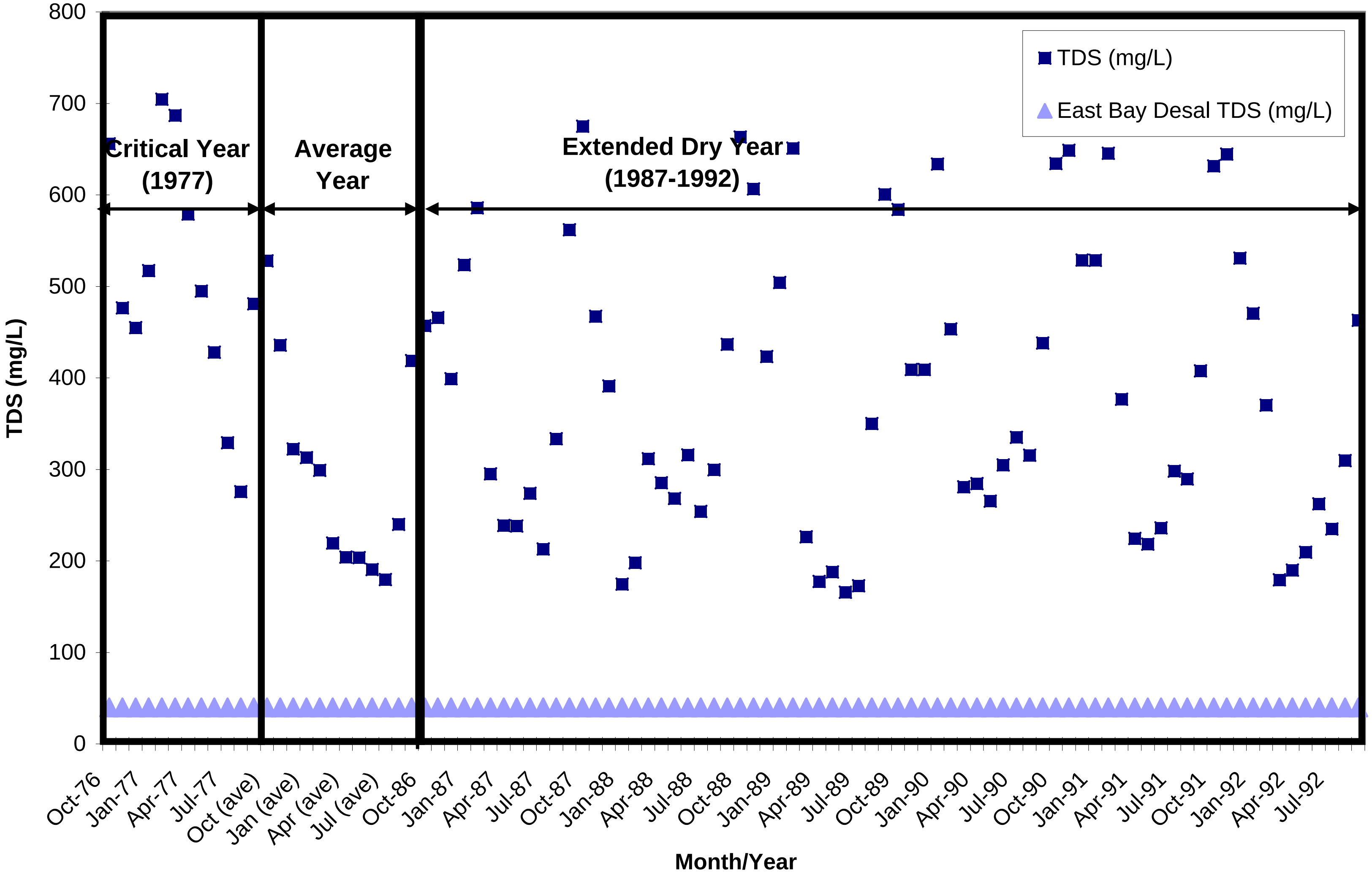


Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Source Water TDS with Concept TDS

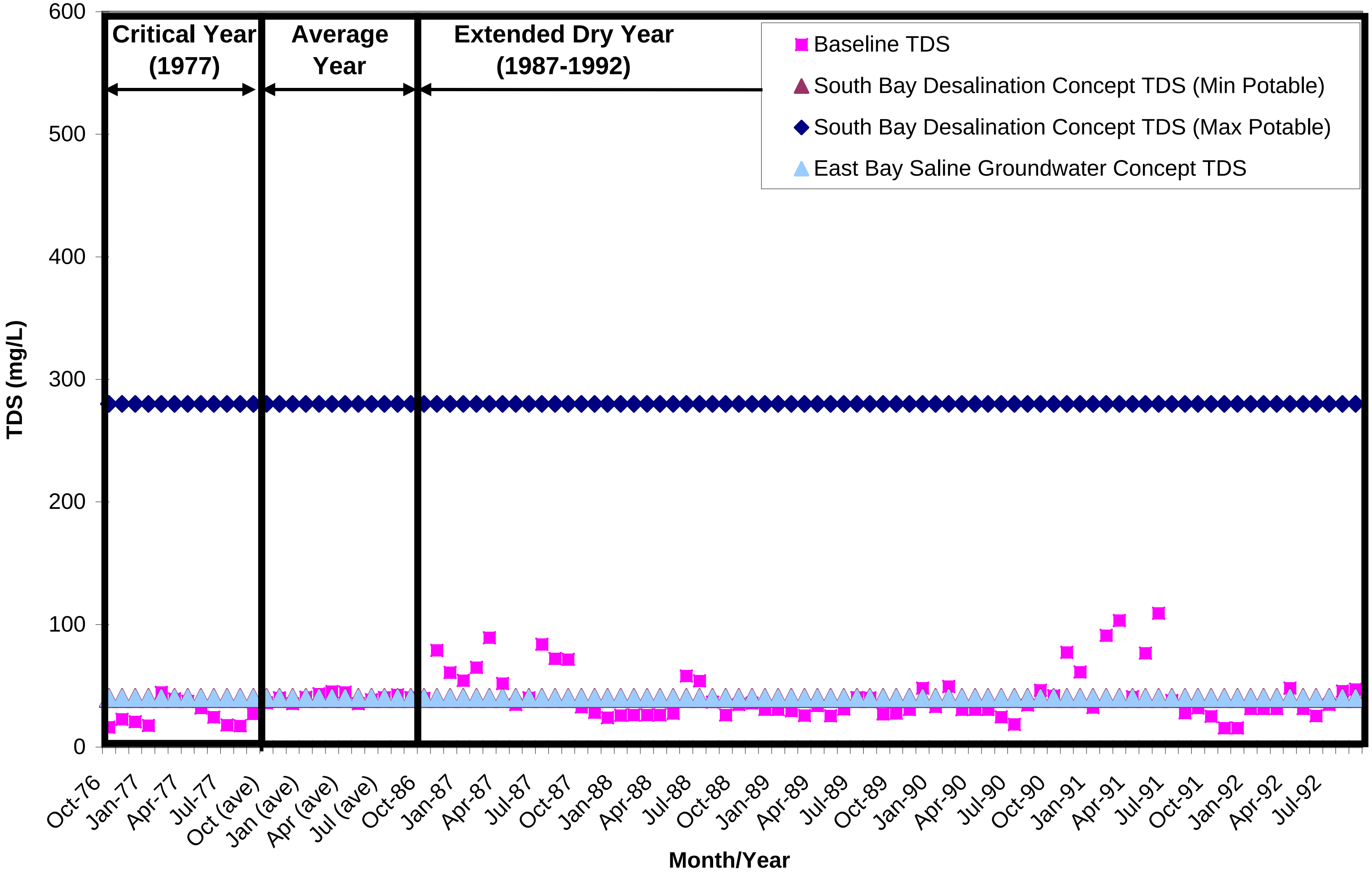


Note: East Bay Desal TDS reflects TDS in pure desalinated supply. This would be blended with ACWD supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Source Water TDS with Concept TDS

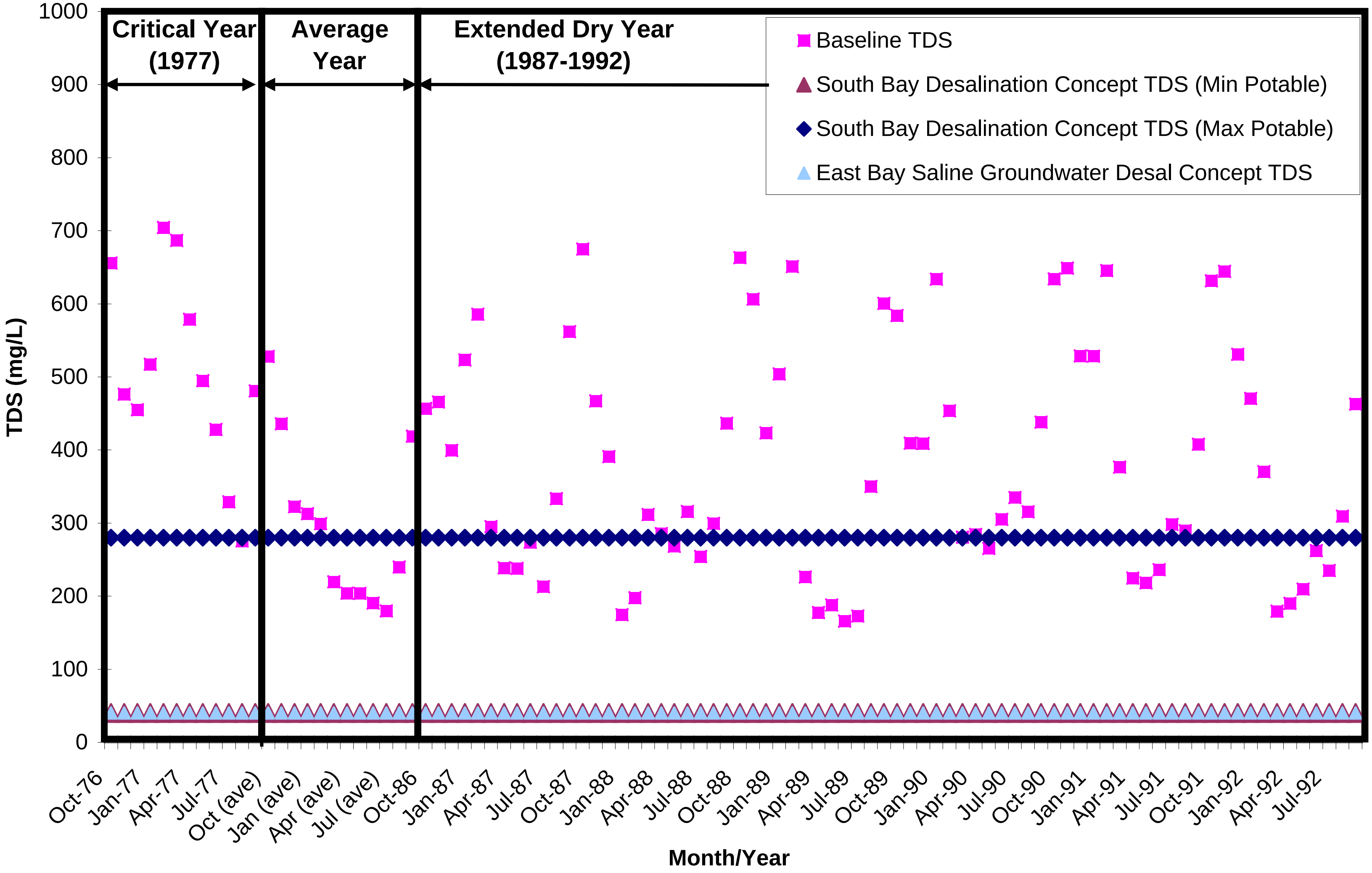


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Source Water TDS with Concept TDS

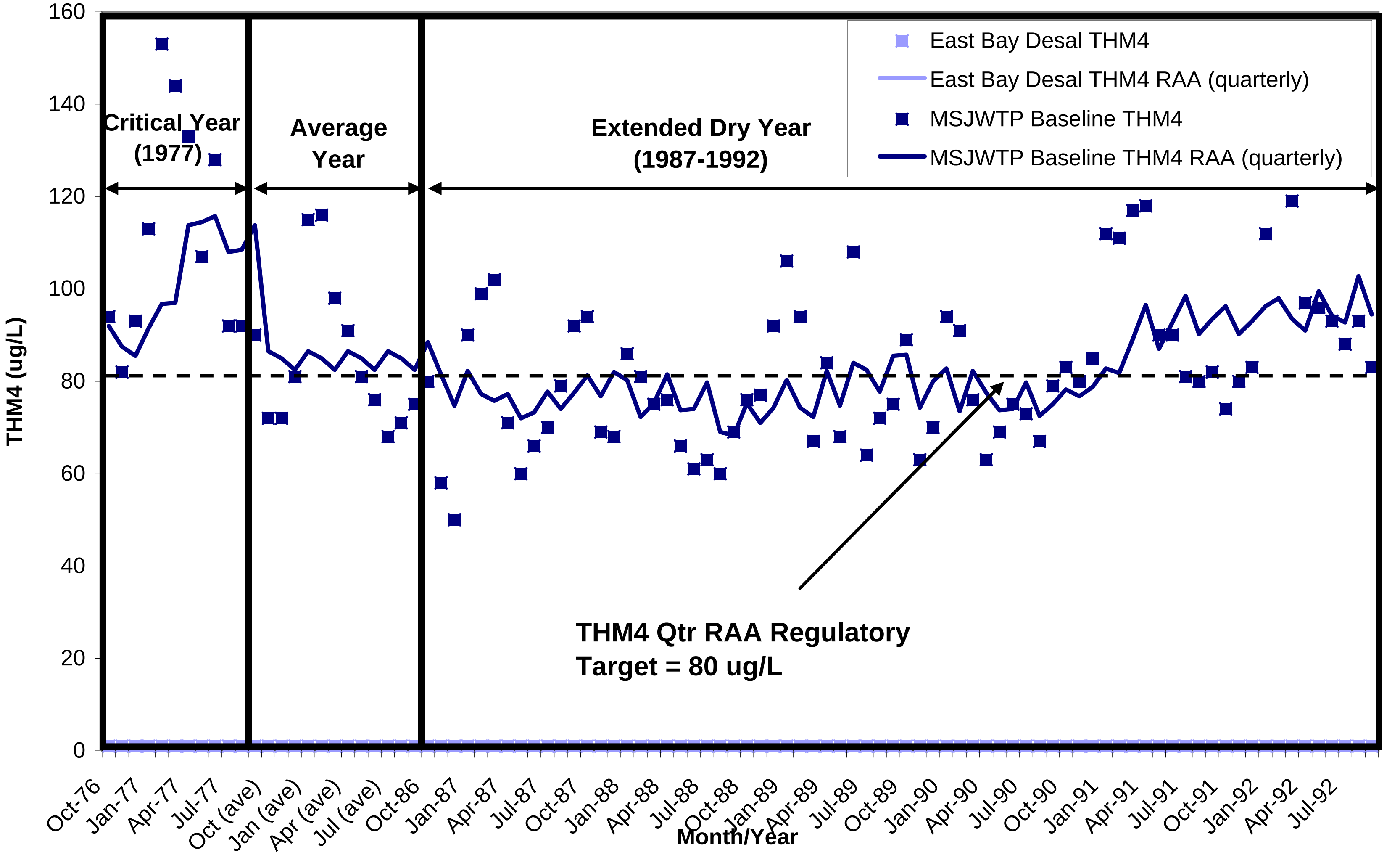


Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (MSJWTP)

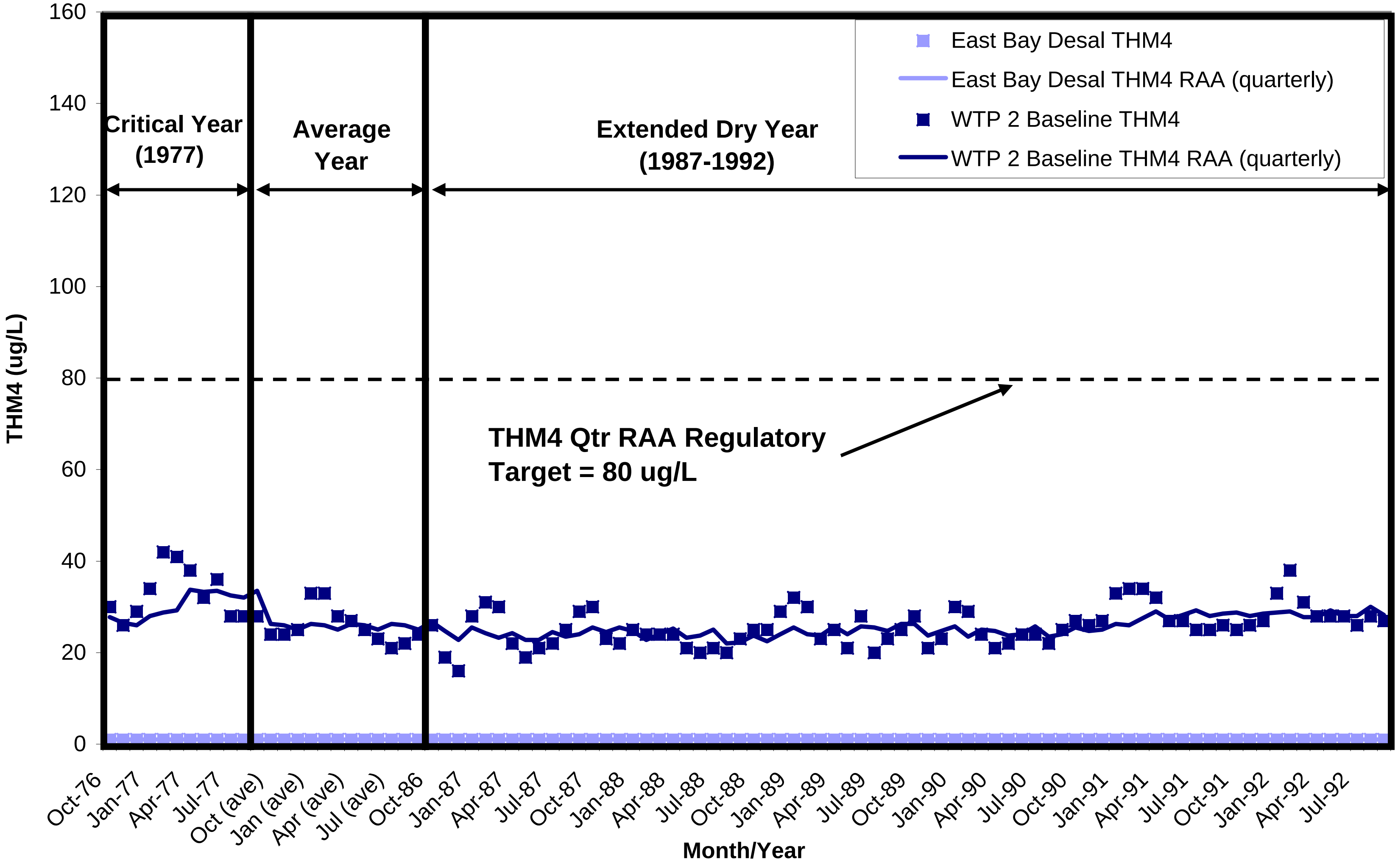


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for MSJWTP .

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline THM4 with Concept THM4 (WTP 2)

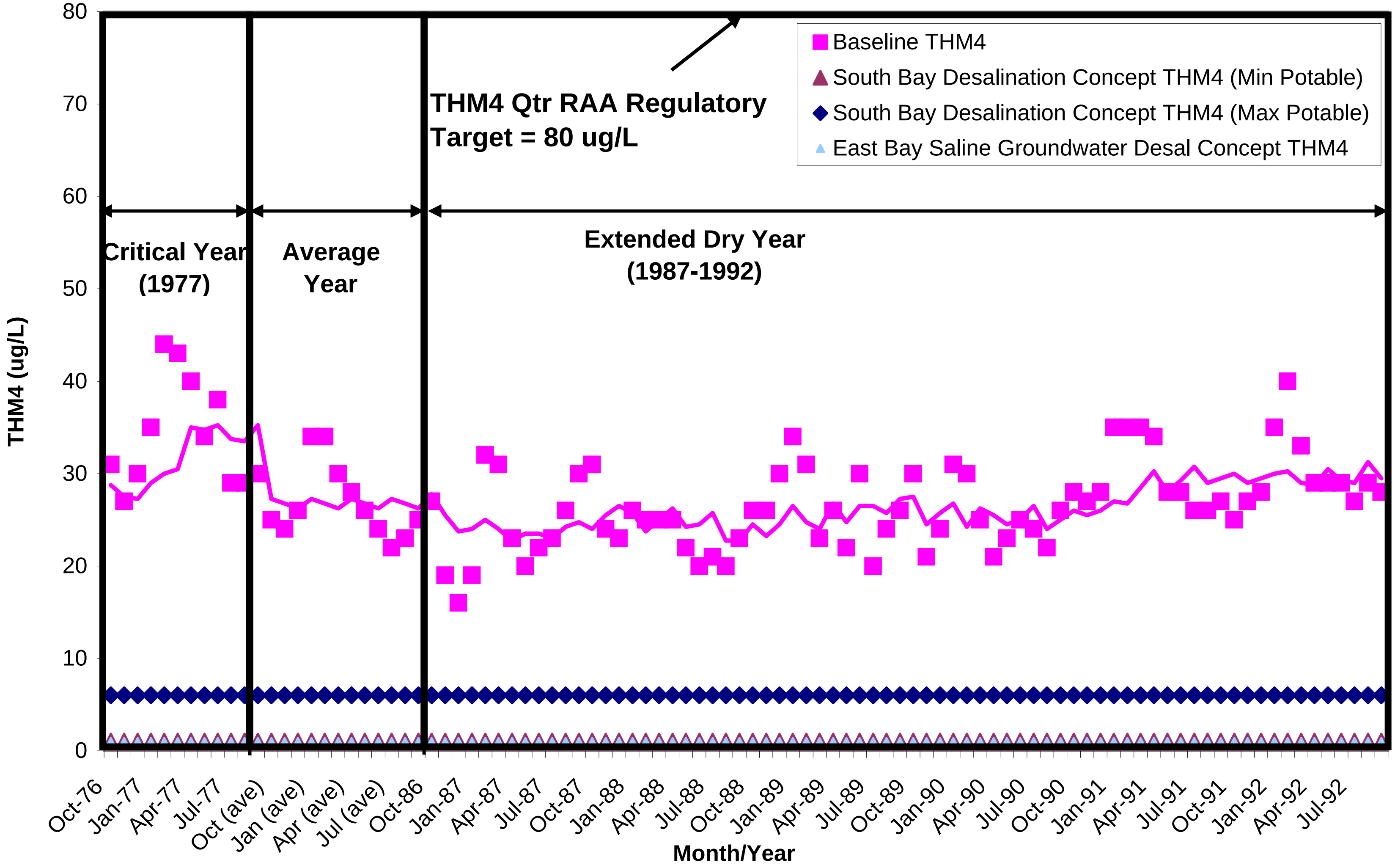


Note: East Bay Desal THM4 reflects THM4 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline THM4 with Concept THM4

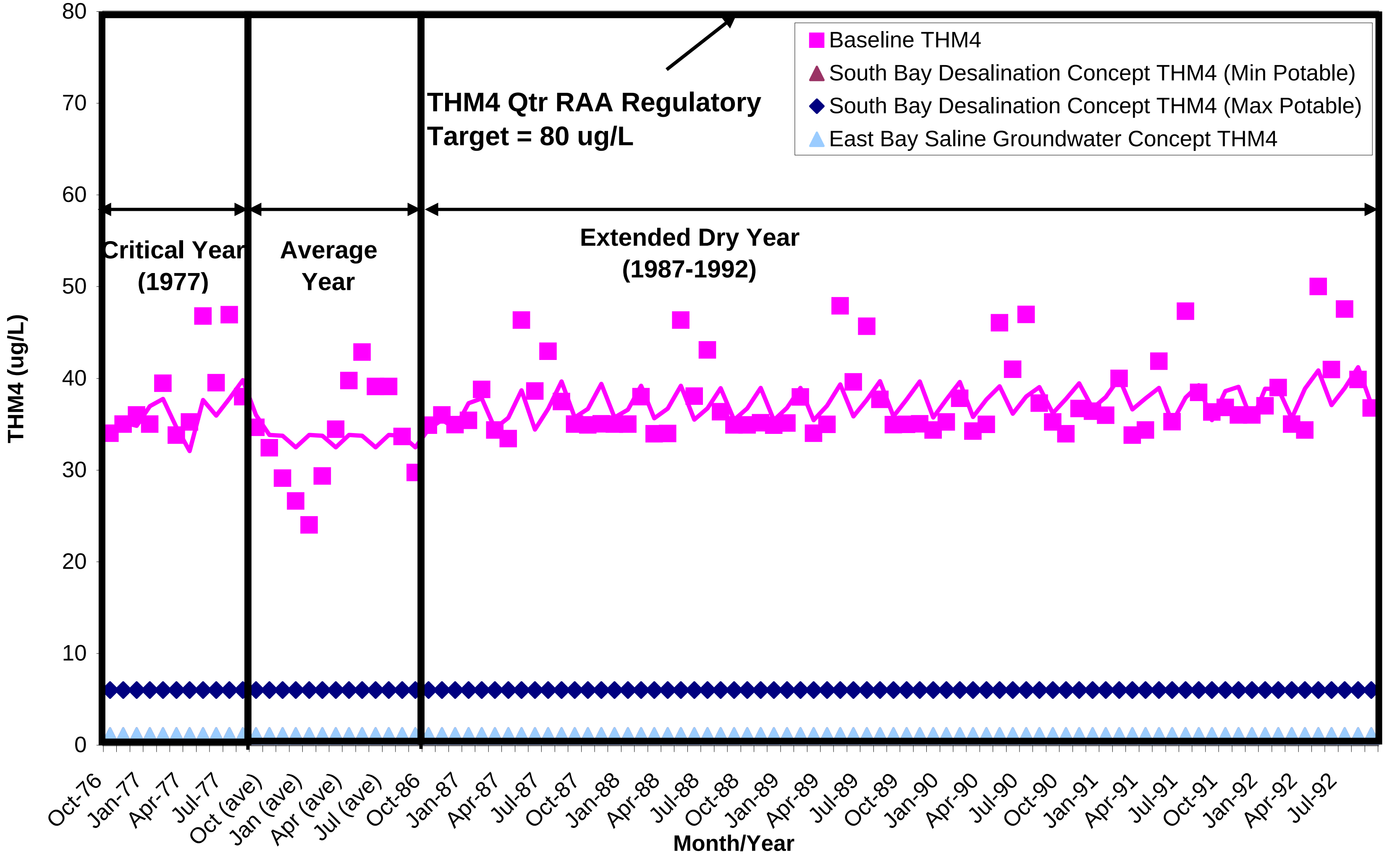


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. Simulated baseline DBP production assumes settled water ozonation.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline THM4 with Concept THM4

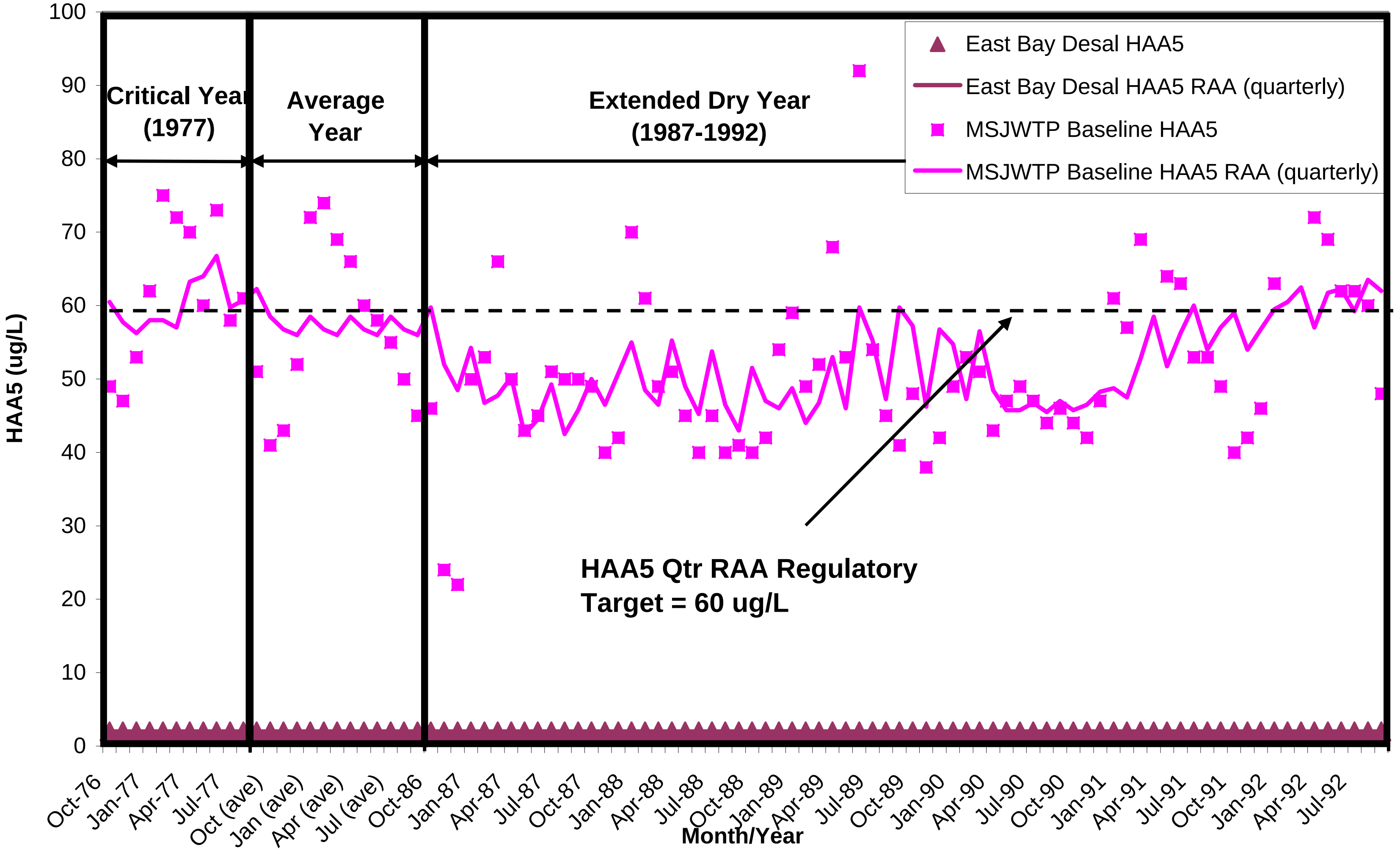


Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. Simulated DBP production for supply entering BDPLs.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline HAA5 with Concept HAA5 (MSJWTP)

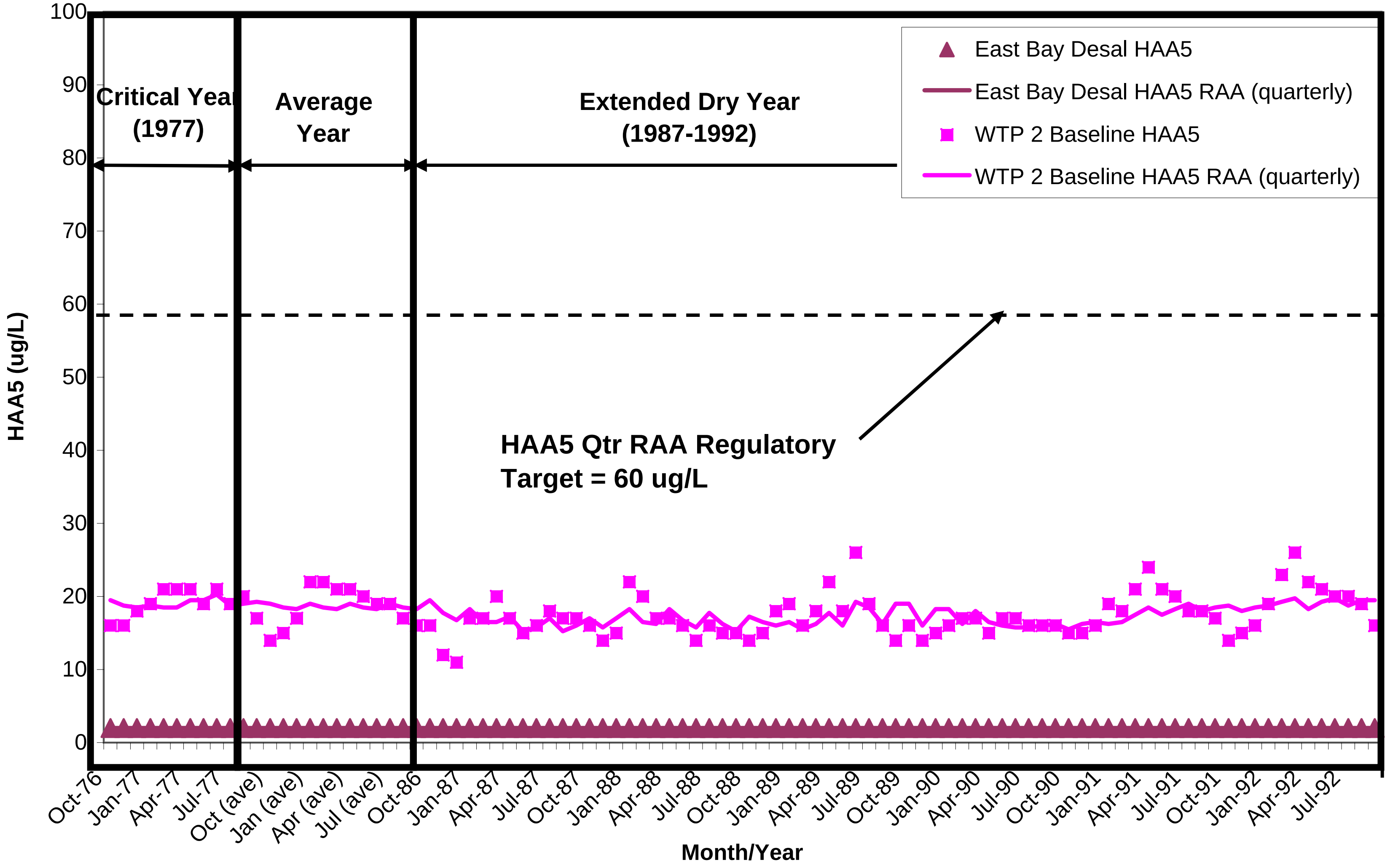


Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for MSJWTP .

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline HAA5 with Concept HAA5 (WTP 2)

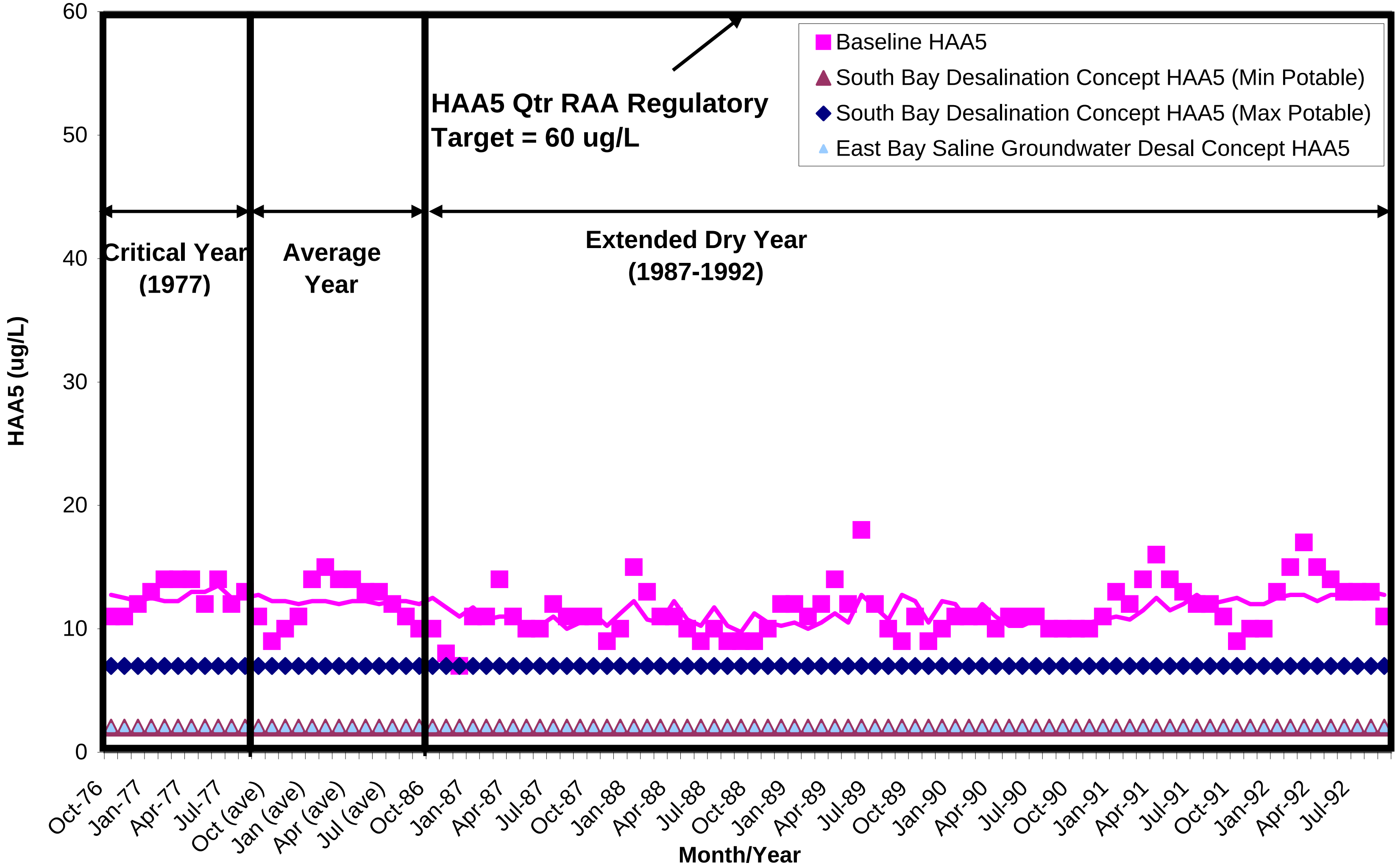


Note: East Bay Desal HAA5 reflects HAA5 in pure desalinated supply. This will be blended with ACWD supplies in the distribution system. Simulated DBP production for WTP 2.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline HAA5 with Concept HAA5

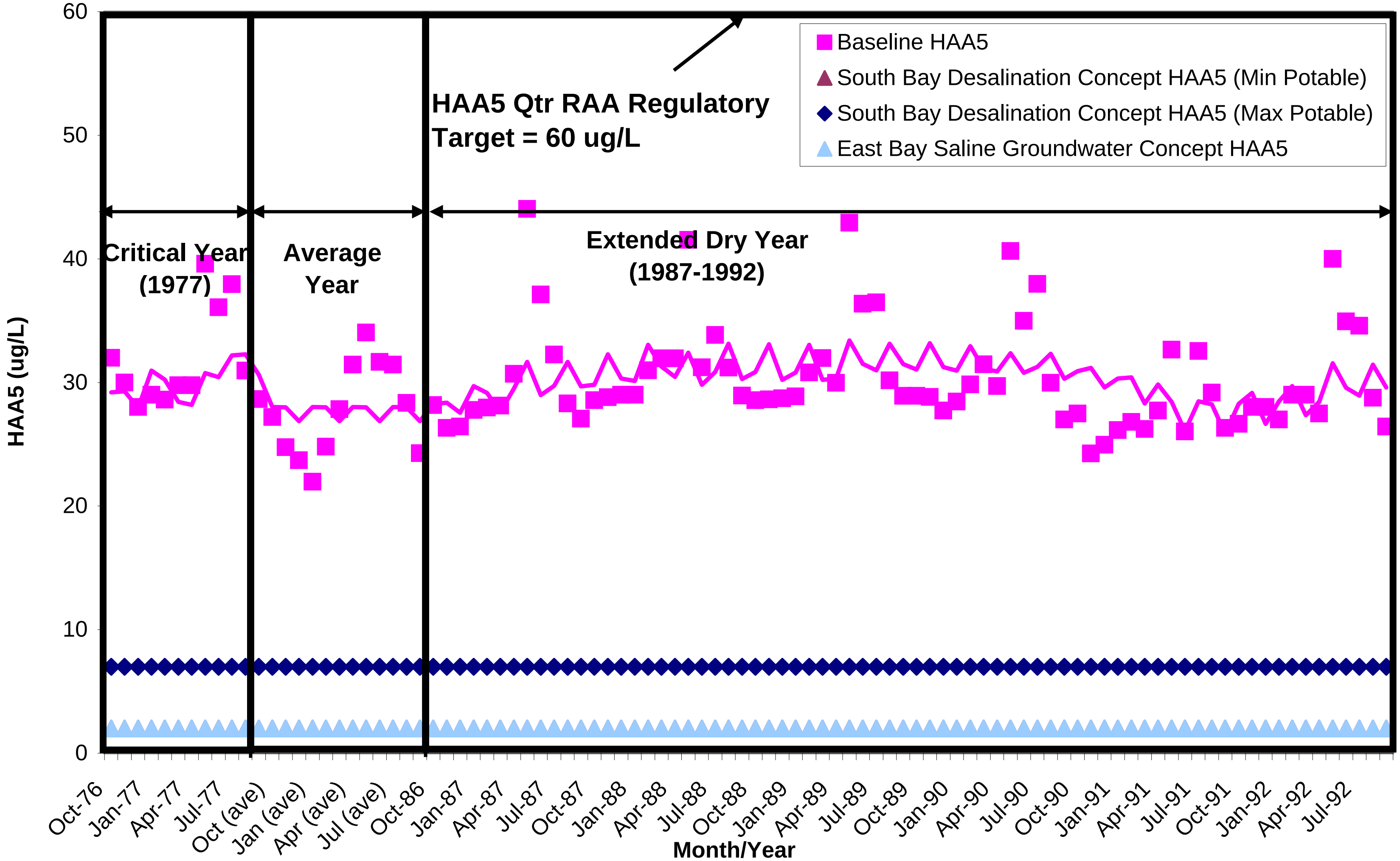


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. Simulated baseline DBP production assumes settled water ozonation.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SFPUC Baseline HAA5 with Concept HAA5

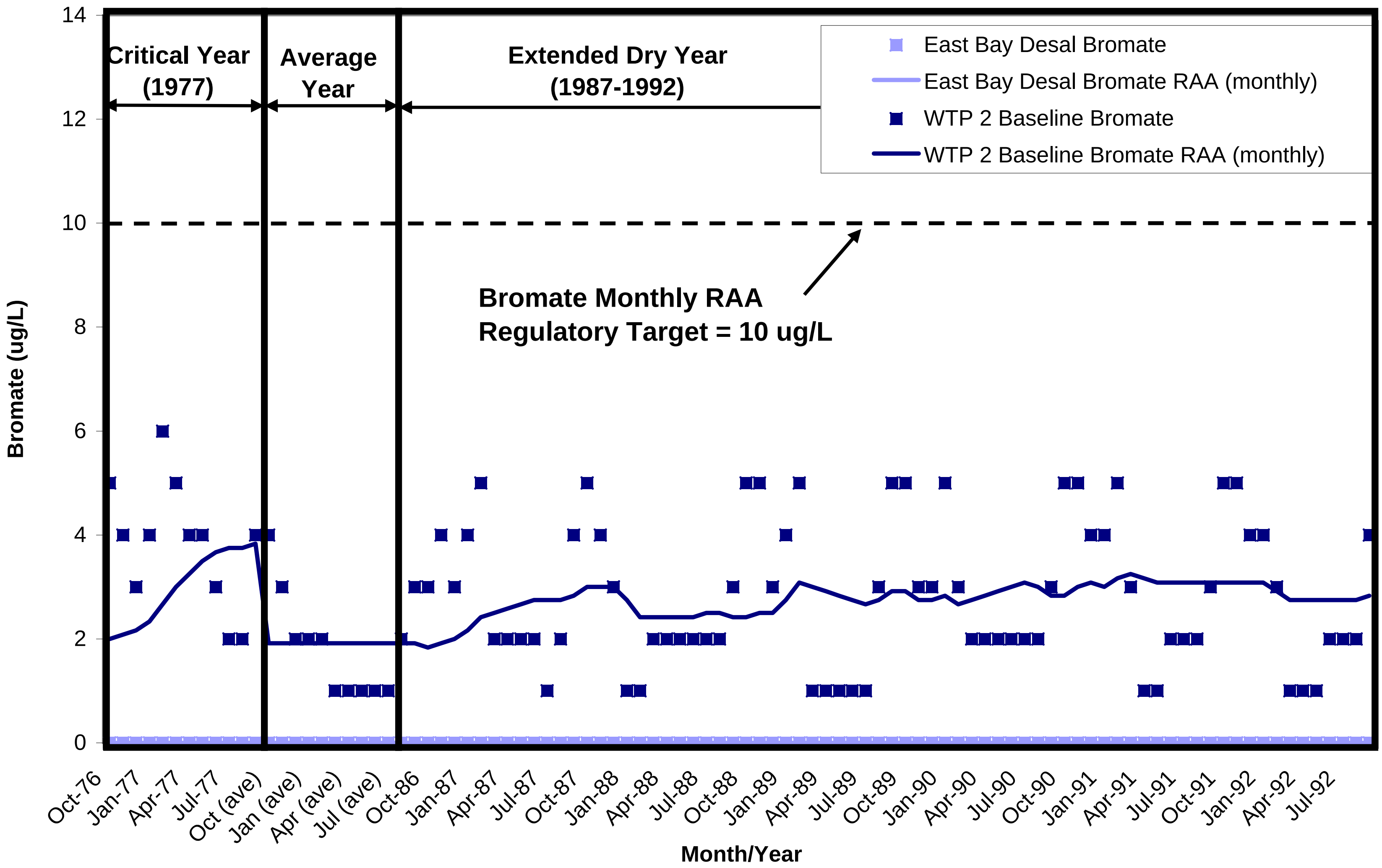


Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. Simulated DBP production for supply entering BDPLs.

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of ACWD Baseline Bromate with Concept Bromate (WTP 2)

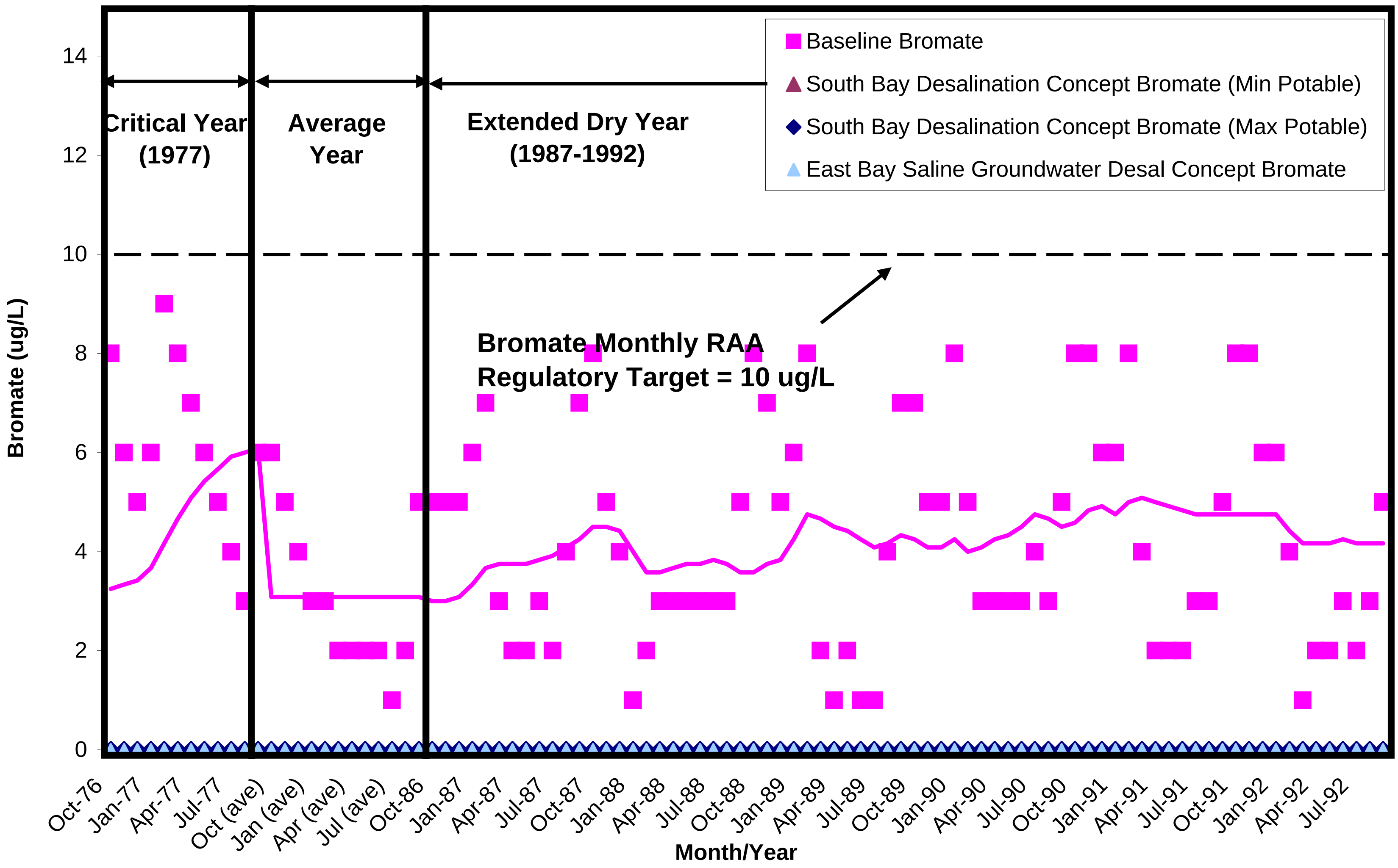


Note: East Bay Desal is not expected to generate detectable concentrations of bromate. Simulated DBP production for WTP 2 .

Example Portfolio: Maximize Supply Reliability without Storage

Concepts Included:
RDP
East Bay Desalination
South Bay Desalination
Enhanced Conservation
Water Recycling

Comparison of SCVWD Baseline Bromate with Concept Bromate



Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. Simulated baseline DBP production assumes settled water ozonation.

Agency Scorecards

G17 ACWD Concepts

G17 Alameda County Water District : All Concepts

DESCRIPTION

Alameda County Water District (ACWD) is a potential beneficiary for the following five concepts:

- Los Vaqueros Reservoir Expansion.
- Calaveras Reservoir Expansion
- East Bay Saline Groundwater Desalination
- Enhanced Conservation
- Recycled Water Concepts

The attached scorecard summarizes information for four of these concepts. Enhanced conservation is not included on the scorecards because no specific conservation thresholds have been established.

Each of the concepts and the potential benefits for ACWD are summarized below.

ACWD Concepts Summary

Los Vaqueros Reservoir Expansion

Average Year Water Quality	34,000 AFY
Dry Year Supply Reliability/WQ	Up to 16,100 AFY

Calaveras Reservoir Expansion (water quality operation)

Average Year Water Quality	Up to 41,000 AFY
Dry Year Supply Reliability	Up to 50,000 AFY

Calaveras Reservoir Expansion (supply reliability operation)

Average Year Water Quality	0 AFY
Dry Year Supply Reliability	Up to 53,000 AFY

East Bay Saline Groundwater Desalination

Average Year Water Quality	Up to 16,000 AFY
Dry Year Supply Reliability	Up to 16,000 AFY

Enhanced Conservation

Supply, All Years	TBD in future studies.

Recycled Water Concepts

Supply, All Years	Up to 1,700 AFY

Los Vaqueros Reservoir Expansion

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability Program (BAWQ&SRP), the multipurpose operating scenario for a 500,000 AF reservoir with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the BAWQ&SRP as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are Contra Costa Water District (CCWD), ACWD, Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

Los Vaqueros studies estimate that 16,000 AFY could be delivered to ACWD in a critically dry year (6,000 AFY entitlement delivery and 10,000 AFY dry-year supply reliability), and that 12,500 AFY could be delivered in an extended drought period (7,200 AFY entitlement delivery and 5,300 AFY dry-year supply reliability), resulting in dry-year water quality and supply reliability benefits. ACWD would receive a water quality benefit from entitlement deliveries in average years. For 1984, which is used as an example of a normal hydrologic year, 34,000 AFY is delivered to ACWD, the entire entitlement amount in this year.

Calaveras Reservoir Expansion

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 AF up to 420,000 AF. An SFPUC study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. The BAWQ&SRP is evaluating potential facilities that would be required and operating scenarios that could be implemented if the reservoir were expanded to 420,000 AF. These scenarios and facilities are presented for illustrative purposes only.

Two operational scenarios are being considered for the Calaveras Reservoir expansion: 1) a water quality and dry-year supply reliability operational scenario, where up to 50,000 AFY would be delivered to South Bay Aqueduct (SBA) contractors ACWD and SCVWD during average years, via a new connection to the SBA, and up to 41,000 AFY could be delivered to SFPUC, ACWD and SCVWD in dry years; and 2) a dry-year supply reliability scenario in which SFPUC (retail and wholesale customers), ACWD and SCVWD would potentially receive up to 53,000 AFY.

❑ *East Bay Saline Groundwater Desalination Project*

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD (treated production capacity) desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the saline portion of the Newark Aquifer. Water would be extracted through a series of bay-shore perimeter wells within ACWD's service district area. Finished water could be pumped directly into ACWD's distribution system or into SFPUC's Bay Division Pipelines 1& 2 in its regional transmission system. Concentrate discharge could potentially be disposed of by delivering it to the East Bay Discharge Authority (EBDA) discharge pipeline, several miles north of the project area, or other options to be identified and evaluated during project planning. This concept has a potential dry-year supply reliability and average year water quality benefit of up to 16,000 AFY. Potential beneficiaries are ACWD (dry-year supply and average year water quality), SFPUC (dry-year supply only for retail and wholesale customers), and SCVWD (details to be developed in future studies).

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SRP. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors, it is unlikely that all projects identified would proceed.

ACWD has one potential recycled water concept, the ACWD-USD Recycled Water Feasibility Study Project, Phase I, with a project yield of 1,700 AFY.

Table G17-1 - Supply Reliability Score Card

Concept or Example Portfolio	Agency Baseline Amount or Description	Units	Concept Amount or Description	Units	Agency Baseline Plus Concept Amount or Description	Units	Notes/Other
Meet Demand							
Critical Drought							The results of the Calaveras Reservoir Expansion - Water Quality are reported for the maximize water quality operation of a 420,000 AF expanded reservoir, for 41,000 AFY dry-year yield and 50,000 AFY delivered in average or wet years either through interconnections with the SFPUC system, or directly into the SBA downstream of Zone 7. Water quality results shown for blending of Calaveras supply with ACWD and SCVWD SBA supplies downstream of Zone 7. East Bay Saline Groundwater would be extracted through a series of bay shore perimeter wells within ACWD's service district area. Finished water will be pumped directly into ACWD's distribution system and/or into the Bay Division pipeline of San Francisco's Hetch Hetchy system. Alternatives for concentrate discharge include disposal to the East Bay Discharge Authority (EBDA) discharge line. Los Vaqueros Reservoir Expansion results reported for 500,000 AF reservoir with 1,750 cfs diversion, and both water quality and supply reliability objectives (Scenario 5A). Allocations amongst SBA contractors for baseline and expanded reservoir scenario provided by LVR Expansion Studies Team.
Concept							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	20,600	AFY	Up to 53,000	AFY	Up to 42,700	AFY	
Calaveras Reservoir Expansion - Water Quality	20,600	AFY	Up to 41,000	AFY	Up to 42,700	AFY	
East Bay Saline Groundwater Desalination	20,600	AFY	Up to 16,000	AFY	Up to 36,600	AFY	
Los Vaqueros Reservoir Expansion[1,2]	20,600	AFY	Up to 10,300	AFY	Up to 30,900	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Regional Desalination Project	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	20,600	AFY	Up to 1,650	AFY	20,600	AFY	
Extended Drought							
Concept							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	25,500	AFY	Up to 53,000	AFY	Up to 42,700	AFY	
Calaveras Reservoir Expansion - Water Quality	25,500	AFY	Up to 41,000	AFY	Up to 42,700	AFY	
East Bay Saline Groundwater Desalination	25,500	AFY	Up to 16,000	AFY	Up to 41,500	AFY	
Los Vaqueros Reservoir Expansion[1,2]	25,500	AFY	Up to 5,300	AFY	Up to 30,800	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Regional Desalination Project	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	25,500	AFY	Up to 1,650	AFY	25,500	AFY	
Average Year							
Concept							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	42,700	AFY	-	AFY	42,700	AFY	
Calaveras Reservoir Expansion - Water Quality	42,700	AFY	Up to 50,000	AFY	42,700	AFY	
East Bay Saline Groundwater Desalination	42,700	AFY	Up to 16,000	AFY	42,700	AFY	
Los Vaqueros Reservoir Expansion[1,2]	42,700	AFY	-	AFY	42,700	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Regional Desalination Project	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	42,700	AFY	Up to 1,650	AFY	42,700	AFY	
Vulnerability							
Concept							
Bay Area Use of the Freeport Regional Water Project	Delta supply sources susceptible to liquefaction of Delta levees and water quality problems.		N/A				
Calaveras Reservoir Expansion - Water Supply			Reduces Vulnerability - The Calaveras Reservoir expansion reduces vulnerability of ACWD and SCVWD to potential Delta water quality problems. The expansions also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP				
Calaveras Reservoir Expansion - Water Quality			Reduces Vulnerability - Calaveras Reservoir expansion reduces vulnerability of SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
East Bay Saline Groundwater Desalination			Reduces Vulnerability - Provides separate connection point to ACWD if South Bay Aqueduct or SFPUC supply were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
Los Vaqueros Reservoir Expansion			Reduces Vulnerability - Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or Sout				
Mirant Desalination with Water Quality Element			N/A				
Near Bay Bridge Desalination with Water Quality Element			N/A				
Regional Desalination Project			N/A				
South Bay Desalination - Irrigation Use			N/A				
South Bay Desalination - Potable Use			N/A				
Water Recycling			No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems of potential participating agencies.				
Self-Sufficiency within the Region							
Concept							
Bay Area Use of the Freeport Regional Water Project	N/A						
Calaveras Reservoir Expansion - Water Supply	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
Calaveras Reservoir Expansion - Water Quality	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
East Bay Saline Groundwater Desalination	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
Los Vaqueros Reservoir Expansion	Increases Self-Sufficiency within the Region - Under all institutional structures, CCWD would retain ownership and control of the watershed and operations of the project (CALFED, 2004). An ownership agreement would be developed outlining this. A governi						
Mirant Desalination with Water Quality Element	N/A						
Near Bay Bridge Desalination with Water Quality Element	N/A						
Regional Desalination Project	N/A						
South Bay Desalination - Irrigation Use	N/A						
South Bay Desalination - Potable Use	N/A						
Water Recycling	Increases Self-Sufficiency within Region - Concepts will be owned, operated, and controlled locally.						

1. ACWD baseline SWP supply numbers are based on SBA delivery information generated by internal District modeling conducted after the Los Vaqueros Expansion studies modeling used in this study. Los Vaqueros Reservoir Expansion concept supply quantities t

2. Los Vaqueros Reservoir Expansion concept supply quantities reflect supply reliability increment only and do not include EWA water. Supply quantities exclude Semitropic groundwater banking program deliveries.

Table G17-2 - Public Health Protection Scorecard (Page 1 of 2)

Performance Measure/Objective	Concept		Agency Baseline Plus Concept		Notes
	Concept Source Water	Concept Treated Water	Concept Plus ACWD Source Water	Concept Plus ACWD Treated Water	
Variability for Treatment					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	No effect on untreated water quality of current plants
Los Vaqueros Reservoir Expansion	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	
Total Dissolved Solids					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
East Bay Saline Groundwater Desalination	Reduces TDS	Reduces TDS	NA	NA	Reduced TDS for customers receiving East Bay Saline Groundwater Desalinated water
Los Vaqueros Reservoir Expansion	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	
Disinfection By-Products					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
East Bay Saline Groundwater Desalination	Reduces DBPs	Reduces DBPs	NA	NA	Improved overall quality
Los Vaqueros Reservoir Expansion	NA	NA	NA	Reduces DBPs	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	

Table G17-2 - Public Health Protection Scorecard (Page 2 of 2)

	Concept		Baseline Plus Concept		
Performance Measure/Objective	Concept Source Water	Concept Treated Water	Concept Plus ACWD Source Water	Concept Plus ACWD Treated Water	Notes
Taste and Odor Problems (Excluding TDS)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	Improves T&O	Improvement in source water quality
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	Improves T&O	Improvement in source water quality
East Bay Saline Groundwater Desalination	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
Los Vaqueros Reservoir Expansion	NA	NA	NA	Improves T&O	Improvement in source water quality. Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	NA	NA	NA	NA	
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Calaveras Reservoir Expansion - Water Quality	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
East Bay Saline Groundwater Desalination	NA	NA	Reduces Potential for Degradation	NA	East Bay Saline Groundwater Desalination treated water quality is comparable to SFPUC water quality (improved quality compared to SBA source).
Los Vaqueros Reservoir Expansion	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
Calaveras Reservoir Expansion - Water Quality	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
East Bay Saline Groundwater Desalination	NA	NA	No Effect on Potential for Degradation	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
Los Vaqueros Reservoir Expansion	NA	NA	TBD[1]	TBD[1]	Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	No Effect on Potential for Degradation	N/A			

1. To be determined in future studies.

Table G17-2a - Public Health Protection Score Card by Agency

Concept: Calaveras Reservoir Expansion - Water Quality[1]

			Agency Baseline			**Concept**		**Baseline Plus Concept**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**Calaveras Expansion Concept Source Water**	**Calaveras Expansion Concept Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water (MSJWTP)**	**Calaveras Expansion plus Agency Baseline Treated Water (WTP 2)**	**Notes**
Supply Quantity											
Critical Year		AFY	20,600			41,000		42,700			
Extended Dry Year		AFY	25,500			41,000		42,700			
Average Year		AFY	42,700			50,000		42,700			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	NA	0.17 - 0.23	0.12 - 0.17	0.15 - 0.20	
	Mean	mg/L	0.37	0.28	0.33	NA	NA	0.21	0.15	0.19	
TOC	Range	mg/L	3.4 - 7.333	2.9 - 6.4	2.3 - 5.5	NA	NA	3.1 - 5.2	2.6 - 4.5	2.1 - 3.8	
	Mean	mg/L	5.06	4.38	3.7	NA	NA	4.0	3.4	2.8	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.5	0.03 - 0.41	0.04 - 0.47	NA	NA	0.05 - 0.23	0.03 - 0.17	0.04 - 0.21	
	Mean	mg/L	0.26	0.20	0.23	NA	NA	0.17	0.12	0.15	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	NA	NA	1.7 - 6.8	1.4 - 6.0	1.0 - 5.1	
	Mean	mg/L	3.70	3.17	2.6	NA	NA	3.4	2.9	2.3	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	NA	0.08 - 0.11	0.05 - 0.08	0.07 - 0.10	
	Mean	mg/L	0.19	0.14	0.17	NA	NA	0.10	0.07	0.09	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	NA	2.2 - 4.3	1.8 - 3.7	1.4 - 3.0	
	Mean	mg/L	3.99	3.43	2.8	NA	NA	3.3	2.8	2.2	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	NA	276 - 315	298 - 338	307 - 347	
	Mean	mg/L	507	529	561	NA	NA	312	334	343	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	NA	166 - 324	188 - 346	197 - 355	
	Mean	mg/L	384	406	438	NA	NA	266	289	298	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	NA	173 - 195	195 - 218	204 - 226	
	Mean	mg/L	296	319	350	NA	NA	182	205	213	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	2 - 6	NA	NA	NA	ND - ND	2 - 2	
	Mean	ug/L	NA	ND	4	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	82 - 153	26 - 42	NA	NA	NA	73 - 107	23 - 31	
	Mean	ug/L	NA	110	33	NA	NA	NA	87	27	
HAA5	Range	ug/L	NA	47 - 75	16 - 21	NA	NA	NA	47 - 66	16 - 20	
	Mean	ug/L	NA	61	19	NA	NA	NA	56	18	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 5	NA	NA	NA	ND - ND	1 - 2	
	Mean	ug/L	NA	ND	3	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	50 - 142	16 - 38	NA	NA	NA	49 - 119	16 - 32	
	Mean	ug/L	NA	83	26	NA	NA	NA	74	23	
HAA5	Range	ug/L	NA	22 - 92	11 - 26	NA	NA	NA	24 - 92	12 - 26	
	Mean	ug/L	NA	52	17	NA	NA	NA	51	17	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 4	NA	NA	NA	ND - ND	1 - 1	
	Mean	ug/L	NA	ND	2	NA	NA	NA	ND	1	
THM4	Range	ug/L	NA	68 - 116	21 - 33	NA	NA	NA	51 - 85	17 - 25	
	Mean	ug/L	NA	85	26	NA	NA	NA	69	22	
HAA5	Range	ug/L	NA	41 - 74	14 - 22	NA	NA	NA	32 - 64	15 - 21	
	Mean	ug/L	NA	57	19	NA	NA	NA	52	18	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall quality	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

1. Critical and Extended Dry Year water quality evaluations assume delivery of 41,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7. Average year water quality evaluation assumes delivery of 50,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7.

Table G17-2b - Public Health Protection Score Card by Agency

Concept: Calaveras Reservoir Expansion - Water Supply Reliability [1]

			Agency Baseline			Concept		Baseline Plus Concept			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**Calaveras Expansion Concept Source Water**	**Calaveras Expansion Concept Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water (MSJWTP)**	**Calaveras Expansion plus Agency Baseline Treated Water (WTP 2)**	**Notes**
Supply Quantity											
Critical Year		AFY	20,600			41,000		42,700			
Extended Dry Year		AFY	25,500			41,000		42,700			
Average Year		AFY	42,700			50,000		42,700			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	NA	0.17 - 0.20	0.12 - 0.15	0.15 - 0.18	
	Mean	mg/L	0.37	0.28	0.33	NA	NA	0.19	0.14	0.17	
TOC	Range	mg/L	3.4 - 7.3	2.9 - 6.4	2.3 - 5.5	NA	NA	3.0 - 4.9	2.5 - 4.20	2.0 - 3.50	
	Mean	mg/L	5.06	4.38	3.7	NA	NA	3.8	3.3	2.7	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.41	0.04 - 0.47	NA	NA	0.05 - 0.20	0.03 - 0.15	0.04 - 0.27	
	Mean	mg/L	0.26	0.20	0.23	NA	NA	0.16	0.11	0.14	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	NA	NA	1.7 - 6.8	1.4 - 6.0	1.0 - 5.1	
	Mean	mg/L	3.70	3.17	2.6	NA	NA	3.3	2.8	2.3	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	NA	NA	NA	NA	
	Mean	mg/L	0.19	0.14	0.17	NA	NA	NA	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	NA	NA	NA	NA	
	Mean	mg/L	3.99	3.43	2.8	NA	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	NA	pH is variable but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	NA	Temperature variations are seasonal
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	NA	276 - 286	298 - 308	307 - 317	
	Mean	mg/L	507	529	561	NA	NA	285	307	316	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	NA	166 - 293	188 - 315	197 - 324	
	Mean	mg/L	384	406	438	NA	NA	249	272	281	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	NA	NA	NA	NA	
	Mean	mg/L	296	319	350	NA	NA	NA	NA	NA	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	2 - 6	NA	NA	NA	ND - ND	2 - 2	
	Mean	ug/L	NA	ND	4	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	82 - 153	26 - 42	NA	NA	NA	70 - 101	23 - 30	
	Mean	ug/L	NA	110	33	NA	NA	NA	84	26	
HAA5	Range	ug/L	NA	47 - 75	16 - 21	NA	NA	NA	46 - 65	16 - 20	
	Mean	ug/L	NA	61	19	NA	NA	NA	55	18	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 5	NA	NA	NA	ND - ND	1 - 14	
	Mean	ug/L	NA	ND	3	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	50 - 142	16 - 38	NA	NA	NA	48 - 119	17 - 32	
	Mean	ug/L	NA	83	26	NA	NA	NA	73	23	
HAA5	Range	ug/L	NA	22 - 92	11 - 26	NA	NA	NA	24 - 92	12 - 26	
	Mean	ug/L	NA	52	17	NA	NA	NA	50	17	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 4	NA	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	2	NA	NA	NA	NA	NA	
THM4	Range	ug/L	NA	68 - 116	21 - 33	NA	NA	NA	NA	NA	
	Mean	ug/L	NA	85	26	NA	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	41 - 74	14 - 22	NA	NA	NA	NA	NA	
	Mean	ug/L	NA	57	19	NA	NA	NA	NA	NA	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall quality	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

[1] Critical and Extended Dry Year water quality evaluations assume delivery of 53,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7 in dry and critically dry years. No deliveries are made in average years.

Table G17-2c - Public Health Protection Score Card by Agency [1]

Concept: East Bay Saline Groundwater Desalination

			Agency Baseline			**Concept**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**Agency Baseline Plus East Bay Saline Groundwater Source Water**	**Agency Baseline Plus East Bay Saline Groundwater Treated Water**	**Notes**
Supply Quantity										
Critical Year		AFY	20,600			0	16,000	20,600	16,000	The concept provides up to 16,000 AFY of treated desalinated water (0 AFY of untreated source water) potentially injected into the ACWD distribution system.
Extended Dry Year		AFY	25,500			0	16,000	25,500	16,000	
Average Year		AFY	42,700			0	16,000	42,700	16,000	
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	0.02	NA	NA	
	Mean	mg/L	0.37	0.28	0.33	NA	0.02	NA	NA	
TOC	Range	mg/L	3.4 - 7.3333	2.9 - 6.4	2.3 - 5.5	NA	0.1	NA	NA	
	Mean	mg/L	5.06	4.38	3.7	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.41	0.04 - 0.47	NA	0.02	NA	NA	
	Mean	mg/L	0.26	0.20	0.23	NA	0.02	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	NA	0.1	NA	NA	
	Mean	mg/L	3.70	3.17	2.6	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	0.02	NA	NA	
	Mean	mg/L	0.19	0.14	0.17	NA	0.02	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	0.1	NA	NA	
	Mean	mg/L	3.99	3.43	2.8	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	40	NA	NA	
	Mean	mg/L	507	529	561	NA	40	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	40	NA	NA	
	Mean	mg/L	384	406	438	NA	40	NA	NA	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	40	NA	NA	
	Mean	mg/L	296	319	350	NA	40	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	mg/L	NA	ND - ND	2 - 6	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	4	NA	ND	NA	NA	
THM4	Range	mg/L	NA	82 - 153	26 - 42	NA	ND	NA	NA	
	Mean	mg/L	NA	110	33	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	47 - 75	16 - 21	NA	1	NA	NA	
	Mean	mg/L	NA	61	19	NA	1	NA	NA	
Extended Dry Year										
Bromate	Range	mg/L	NA	ND - ND	1 - 5	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	3	NA	ND	NA	NA	
THM4	Range	mg/L	NA	50 - 142	16 - 38	NA	ND	NA	NA	
	Mean	mg/L	NA	83	26	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	22 - 92	11 - 26	NA	1	NA	NA	
	Mean	mg/L	NA	52	17	NA	1	NA	NA	
Average Year										
Bromate	Range	mg/L	NA	ND - ND	1 - 4	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	2	NA	ND	NA	NA	
THM4	Range	mg/L	NA	68 - 116	21 - 33	NA	ND	NA	NA	
	Mean	mg/L	NA	85	26	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	41 - 74	14 - 22	NA	1	NA	NA	
	Mean	mg/L	NA	57	19	NA	1	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.

Table G17-2d - Public Health Protection Score Card by Agency

Concept: Los Vaqueros Reservoir Expansion

			Agency Baseline			**Quantity of Water Conveyed through the Expanded Reservoir^2**		**Baseline Plus Concept**			
Performance Measure/Objective	**Metric or Qual**	**Units**	**ACWD Source Water (SWP)**	**ACWD Treated Water (MSJWTP)**	**ACWD Treated Water (WTP 2)**	**Los Vaqueros Expansion Concept Source Water**	**Los Vaqueros Expansion Concept Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (MSJWTP)**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (WTP 2)**	**Notes**
Supply Quantity^1											
Critical Year		AFY	20,600			10,300		30,300			
Extended Dry Year		AFY	25,500			5,300		35,300			
Average Year		AFY	42,700			0		34,900			
Minimize Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.12 - 0.41	0.15 - 0.48	NA	NA	0.09 - 0.24	0.06 - 0.17	0.08 - 0.21	
	Mean	mg/L	0.37	0.28	0.33	NA	NA	0.12	0.08	0.11	
TOC	Range	mg/L	3.4 - 7.3333	2.9 - 6.4	2.3 - 5.5	NA	NA	1.8 - 3.4	2.8 - 4.2	2.2 - 3.5	
	Mean	mg/L	5.06	4.38	3.7	NA	NA	2.4	3.3	2.7	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.03 - 0.41	0.04 - 0.47	NA	NA	0.02 - 0.44	0.01 - 0.36	0.02 - 0.41	
	Mean	mg/L	0.26	0.20	0.23	NA	NA	0.15	0.11	0.13	
TOC	Range	mg/L	1.6 - 7.3	1.3 - 6.4	0.9 - 5.5	NA	NA	1.6 - 6.3	1.8 - 5.7	1.4 - 4.8	
	Mean	mg/L	3.70	3.17	2.6	NA	NA	2.7	3.0	2.5	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.05 - 0.31	0.07 - 0.35	NA	NA	0.10 - 0.15	0.07 - 0.11	0.09 - 0.13	
	Mean	mg/L	0.19	0.14	0.17	NA	NA	0.12	0.09	0.11	
TOC	Range	mg/L	2.8 - 5.9	2.4 - 5.1	1.9 - 4.3	NA	NA	1.6 - 1.6	2.7 - 2.7	2.2 - 2.2	
	Mean	mg/L	3.99	3.43	2.8	NA	NA	1.6	2.7	2.2	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	Temperature variations are seasonal
Minimize Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	298 - 727	307 - 736	NA	NA	187 - 355	209 - 377	218 - 386	
	Mean	mg/L	507	529	561	NA	NA	221	243	275	
Extended Dry Year	Range	mg/L	166 - 675	188 - 697	197 - 706	NA	NA	147 - 597	169 - 619	178 - 628	
	Mean	mg/L	384	406	438	NA	NA	253	276	307	
Average Year	Range	mg/L	180 - 528	202 - 550	211 - 559	NA	NA	192 - 251	214 - 274	223 - 282	
	Mean	mg/L	296	319	350	NA	NA	218	241	272	
Minimize Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	2 - 6	NA	NA	NA	ND - ND	1 - 3	
	Mean	ug/L	NA	ND	4	NA	NA	NA	ND	1	
THM4	Range	ug/L	NA	82 - 153	26 - 42	NA	NA	NA	69 - 103	22 - 31	
	Mean	ug/L	NA	110	33	NA	NA	NA	80	25	
HAA5	Range	ug/L	NA	47 - 75	16 - 21	NA	NA	NA	54 - 69	18 - 22	
	Mean	ug/L	NA	61	19	NA	NA	NA	59	19	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 5	NA	NA	NA	ND - ND	ND - 5	
	Mean	ug/L	NA	ND	3	NA	NA	NA	ND	2	
THM4	Range	ug/L	NA	50 - 142	16 - 38	NA	NA	NA	47 - 132	16 - 37	
	Mean	ug/L	NA	83	26	NA	NA	NA	76	24	
HAA5	Range	ug/L	NA	22 - 92	11 - 26	NA	NA	NA	35 - 78	15 - 25	
	Mean	ug/L	NA	52	17	NA	NA	NA	55	18	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	1 - 4	NA	NA	NA	ND - ND	1 - 2	
	Mean	ug/L	NA	ND	2	NA	NA	NA	ND	1	
THM4	Range	ug/L	NA	68 - 116	21 - 33	NA	NA	NA	68 - 71	21 - 23	
	Mean	ug/L	NA	85	26	NA	NA	NA	70	22	
HAA5	Range	ug/L	NA	41 - 74	14 - 22	NA	NA	NA	50 - 53	17 - 18	
	Mean	ug/L	NA	57	19	NA	NA	NA	51	18	
Minimize Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall quality	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

1. ACWD SWP supply numbers are based on SBA delivery information generated by internal District modeling, and are updated from those incorporated in the Los Vaqueros Expansion studies. Los Vaqueros Reservoir Expansion concept supply quantities to all agencies, including ACWD, are based on Los Vaqueros Reservoir Expansion Studies modeling. Concept and baseline plus concept delivery quantities to ACWD reflect baseline supplies of 30,700, 18,600, and 34,200 AFY for critical dry, extended dry, and average years, as opposed to the supply baselines presented here.

2. Supply reflected inlcudes all water delivered vis the expanded reservoir for EWA and supply reliability. Concept supply quantities do not include Semitropic groundwater banking program deliveries.

Table G17-3 - Cost, Environmental and Implementation Score Card (Page 1 of 5)

Performance Measure/Objective	Concept	Concept	Amount or Rating	Notes/Other
Cost Impacts				
Cost Impacts	Bay Area Use of the Freeport Regional Water Project	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Supply	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing st
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Calaveras Reservoir Expansion - Water Quality	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing station. Pumping costs estimated as $3.5 M/year. All costs in $2003. Operating costs and annualized costs to be determined as part of future SFPUC studies.
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	East Bay Saline Groundwater Desalination	Capital Cost	TBD[1]	Capital costs associated with the desalination on-site facilities are projected to be $75 million ($2005). Capital costs of ancillary facilities and conveyance, operating and life-cycle costs to be determined as part of future studies.
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Los Vaqueros Reservoir Expansion	Capital Cost	$1500M (2008 $)	Cost estimates from CALFED Los Vaqueros Expansion Studies (CALFED, 2004). Annual costs and potential cost-sharing options will be evaluated in future phases of the CALFED Los Vaqueros Reservoir Expansion studies.
		Operating & Maintenance Cost	$27.5M (2008 $)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Mirant Desalination with Water Quality Element	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Near Bay Bridge Desalination with Water Quality Element	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Regional Desalination Project	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	South Bay Desalination - Irrigation Use	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	South Bay Desalination - Potable Use	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Water Recycling	Capital Cost	Up to $33 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
		Operating & Maintenance Cost	Up to $0.4 M/Yr	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	Up to $2.8 M/Yr	
		Allocation of Costs	Up to $1,694/AF	

1. To be determined in future studies.

Table G17-3 - Cost, Environmental and Implementation Score Card (Page 2 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Impacts to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Overall Impacts to the Environment (Before Mitigation): High Impact** Potential effects are primarily associated with aquatic and terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land and water resources. In addition, other facility development could also affect sensitive biological resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts in and around the watershed at a 3:1 ratio or at a ratio that is deemed appropriate by regulatory agencies.	
	Calaveras Reservoir Expansion - Water Quality	**Overall Impacts to the Environment (Before Mitigation): High Impact.** Potential effects are primarily associated with aquatic and terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land and water resources. In addition, other facility development could also affect sensitive biological resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts in and around the watershed at a 3:1 ratio or at a ratio that is deemed appropriate by regulatory agencies.	
	East Bay Saline Groundwater Desalination	**Overall Impacts to the Environment (Before Mitigation): Low Impac**. Construction and operation of the concept facilities would primarily consist of temporary, construction-related effects. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities to reduce construction and operation impacts include alternative siting of facilities to avoid sensitive resources to the extent feasible, preconstruction surveys (e.g., for special-status species), implementation of site-specific measures (e.g., monitoring during construction, use of exclusionary fencing, restoration), restriction on construction schedule (e.g., during breeding / nesting season of certain bird species if their nests are found nearby), etc. These mitigation measures would ensure that short-term effects are reduced.	
	Los Vaqueros Reservoir Expansion	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Potential effects are primarily associated with terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land. However, design of the facility would benefit aquatic resources, thus offsetting impacts to terrestrial resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts on existing watershed lands and lands owned by potential partner agencies or open space managers. In addition, acquisition of additional land for protection, restoration, and/or enhancement would occur. Mitigation acreage would range from 1,953 to 8,576 acres. Effects on recreation would be offset by the restoration and augmentation of trails (increase in 17 miles of trails).	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Table G17-3 - Cost, Environmental and Implementation Score Card (Page 3 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Benefits to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Overall Benefits to the Environment (Before Mitigation): Low Benefits**. No benefits to the environmental are expected from the construction and operation of this concept prior to mitigation. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Protection, restoration, and enhancement of habitat for plants and wildlife species would be considered a benefit since the acreage protected, restored, or enhanced would likely exceed that affected by concept implementation.	
	Calaveras Reservoir Expansion - Water Quality	**Overall Benefits to the Environment (Before Mitigation): Low Benefits**. The concept has the potential to reduce Delta fisheries impacts, as it would reduce pumping during the normal and wet years. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Protection, restoration, and enhancement of habitat for plants and wildlife species would be considered a benefit since the acreage protected, restored, or enhanced would likely exceed that affected by concept implementation.	
	East Bay Saline Groundwater Desalination	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Implementation of this concept would slightly reduce pumping from the Delta, and thus would be considered an environmental benefit to Delta resources. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would unlikely result in additional benefits to the environment.	
	Los Vaqueros Reservoir Expansion	**Overall Benefits to the Environment (Before Mitigation): High Benefits**. Potential benefits associated with the proposed concept include the following: - Installation of state-of-the-art fish screens for diversions to the SBA, - Flexibility to shift the timing and location of water diversions to protect fish, - System flexibility to store and move water (including for environmental water storage); also, provision of additional storage (for natural disasters, toxic spills, or levee failures in the Delta). **Overall Benefits to the Environment (After Mitigation): High Benefits**. Benefits would then be associated with increased protected and restored land as well as additional recreation opportunities (see mitigation opportunities above).	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** The potential benefits associated with the proposed concepts include offsetting the development of higher capacity water supply projects. This translates to a potential reduction in environmental impacts associated with the construction and operation of larger water-related facilities. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Table G17-3 - Cost, Environmental and Implementation Score Card (Page 4 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Implementation Potential			
External Support	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	TBD[1] - Historically, use of desalination, water recycling and enhanced conservation rather than storage concepts have been viewed as environmentally-friendly alternatives and generated more support than storage projects.	
	Calaveras Reservoir Expansion - Water Quality	TBD[1] - Historically, use of desalination, water recycling and enhanced conservation rather than storage concepts have been viewed as environmentally friendly alternatives and generated more support than storage projects.	
	East Bay Saline Groundwater Desalination	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts is likely to be viewed as an environmentally friendly alternative and generate external support.	
	Los Vaqueros Reservoir Expansion	TBD[1]	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	TBD[1] - Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.	
Ability to Get Outside Funding	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	TBD[1]	
	Calaveras Reservoir Expansion - Water Quality	TBD[1]	
	East Bay Saline Groundwater Desalination	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation rather than storage concepts,	
	Los Vaqueros Reservoir Expansion	TBD[1] - Potential funding sources include any combination of federal (USBR), state (DWR) and local (Bay Area water agencies using the facilities).	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	TBD[1] - The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds.	
Consistency with Local and Regional Plans	All concepts	NA - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	

1. To be determined in future studies.

Table G17-3 - Cost, Environmental and Implementation Score Card (Page 5 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Regional Perspective			
Number of Agencies Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	3	ACWD, SCVWD, SFPUC (retail and wholesale customers)
	Calaveras Reservoir Expansion - Water Quality	3	ACWD, SCVWD, SFPUC (retail and wholesale)
	East Bay Saline Groundwater Desalination	2	ACWD, SFPUC
	Los Vaqueros Reservoir Expansion	4	ACWD, CCWD, SCVWD, Zone 7, SFPUC
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	6,000,000 people	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	4,700,000 people	
	Calaveras Reservoir Expansion - Water Quality	4,700,000 people	
	East Bay Saline Groundwater Desalination	2,200,000 people	
	Los Vaqueros Reservoir Expansion	4,400,000 people	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	6,000,000 people	

Table G17-4 - Environmental Score Card (Page 1 of 5)

Performance	Concept	Concept Rating
Aquatic Environment		
Potential Impacts to Aquatic Environment	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Aquatic Environment (Before Mitigation): Impacts.**Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could then affect habitat for fish. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this would require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions). In addition, continue trout planting.
	Calaveras Reservoir Expansion - Water Quality	**Effects on Aquatic Environment (Before Mitigation): Impacts.**Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could then affect habitat for fish. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this would require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions). In addition, continue trout planting.
	East Bay Saline Groundwater Desalination	**Effects on Aquatic Environment (Before Mitigation): Impacts.**Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources). Effects on aquatic resources from brine discharge are not expected if brine is mixed and diluted with wastewater prior to discharge (e.g., use of EBDA facilities). Construction of concept facilities (desal plant, wells, and pipeline) would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.**Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Los Vaqueros Reservoir Expansion	**Effects on Aquatic Environment (Before Mitigation). Benefits.**Reduces direct fish losses from water diversions (incremental increase in loss of juvenile fish at the new Delta intakes offset by a substantial reduction in direct fish loss at the SWP [or CVP] diversion facility), through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). **Effects on Aquatic Environment (After Mitigation): No Effect.** The concept was designed to minimize potential effects to aquatic environment. Thus, no mitigation measures would be required.
	Mirant Desalination with Water Quality Element	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Aquatic Environment (Before Mitigation): Impacts.**Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.**Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.

Table G17-4 - Environmental Score Card (Page 2 of 5)

Performance	Concept	Concept Rating
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Direct effects from inundation of terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and an area of potential serpentine associated plants. Additional disturbed acreage associated with construction of other facilities (e.g., pipeline, pump station). **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed. In addition, consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Restoration of affected habitat may occur at a 3:1 ratio, or as negotiated with regulatory agencies.
	Calaveras Reservoir Expansion - Water Quality	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Direct effects from inundation of terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and an area of potential serpentine associated plants. Additional disturbed acreage associated with construction of other facilities (e.g., pipeline, pump station). **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed. In addition, consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Restoration of affected habitat may occur at a 3:1 ratio, or as negotiated with regulatory agencies.
	East Bay Saline Groundwater Desalination	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The locations of concept facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, the location of these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new pipelines are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Los Vaqueros Reservoir Expansion	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Total direct effects from both reservoir expansion and facilities construction: - Total direct effects to terrestrial habitat of up to 2,595 acres (permanent and temporary). - 2,081 acres of grassland - 309 acres of oak woodland - 11 acres of chaparral / upland scrub - 0.01 acre of riparian - 3.6 acres of urban-ruderal - 189 acres of agriculture - 1,960 acres from inundation. **Effects on Terrestrial Environment (After Mitigation): Benefits.** The Mitigation strategy would provide for resource enhancement in accordance with CALFED Program guidance and in coordination with regional conservation. It includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres (CALFED, 2004).
	Mirant Desalination with Water Quality Element	NA
	Near Bay Bridge Desalination with Water Quality Elemen	NA
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for eac concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.

Table G17-4 - Environmental Score Card (Page 3 of 5)

Performance	Concept	Concept Rating
Wetlands		
Potential Impacts to Wetlands (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Wetlands (Before Mitigation): Impacts.** Direct effects to marsh habitat from inundation. Siting of other permanent facilities and construction of conveyance facilities may also affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities would be similar to those described above for Terrestrial Environment. Affected lands would be restored at a ratio deemed appropriate by regulatory agencies.
	Calaveras Reservoir Expansion - Water Quality	**Effects on Wetlands (Before Mitigation): Impacts.** Direct effects to marsh habitat from inundation. Siting of other permanent facilities and construction of conveyance facilities may also affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities would be similar to those described above for Terrestrial Environment. Affected lands would be restored at a ratio deemed appropriate by regulatory agencies.
	East Bay Saline Groundwater Desalination	**Effects on Wetlands (Before Mitigation): Impacts.** A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of other facilities could temporarily affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
	Los Vaqueros Reservoir Expansion	**Effects on Wetlands (Before Mitigation): Impacts.** Total direct effects from inundation would be 1.3 acres. **Effects on Wetlands (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes wetlands.
	Mirant Desalination with Water Quality Element	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).

Table G17-4 - Environmental Score Card (Page 4 of 5)

Performance	Concept	Concept Rating
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply.
	Calaveras Reservoir Expansion - Water Quality	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply.
	East Bay Saline Groundwater Desalination	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. However, effects to wetlands may affect associated special status species, either from facility siting or construction. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities for wetlands would be the same as those identified above for Wetlands Resources. Protection of wetlands (or provision of additional wetlands) would protect special status wetland species.
	Los Vaqueros Reservoir Expansion	**Effects on Special-Status Species (Before Mitigation): Impacts.** Each habitat type identified under “terrestrial environment,” above, is associated with special status species, including but not limited to: - San Joaquin kit fox, - California red-legged frog, - California tiger salamander, - Western pond turtle, - Bald eagle, - Curved-foot hygrotis diving beetle, - Mason’s lilaeopsis, - Alkali milk-vetch, - Heartscale, - Brittlescale, - San Joaquin spearscale, - Recurved larkspur, - Contra Costa goldfields, - Vernal pool fairly shrimp, etc. **Effects on Special-Status Species (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes protection of habitat that support these species.
	Mirant Desalination with Water Quality Element	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).

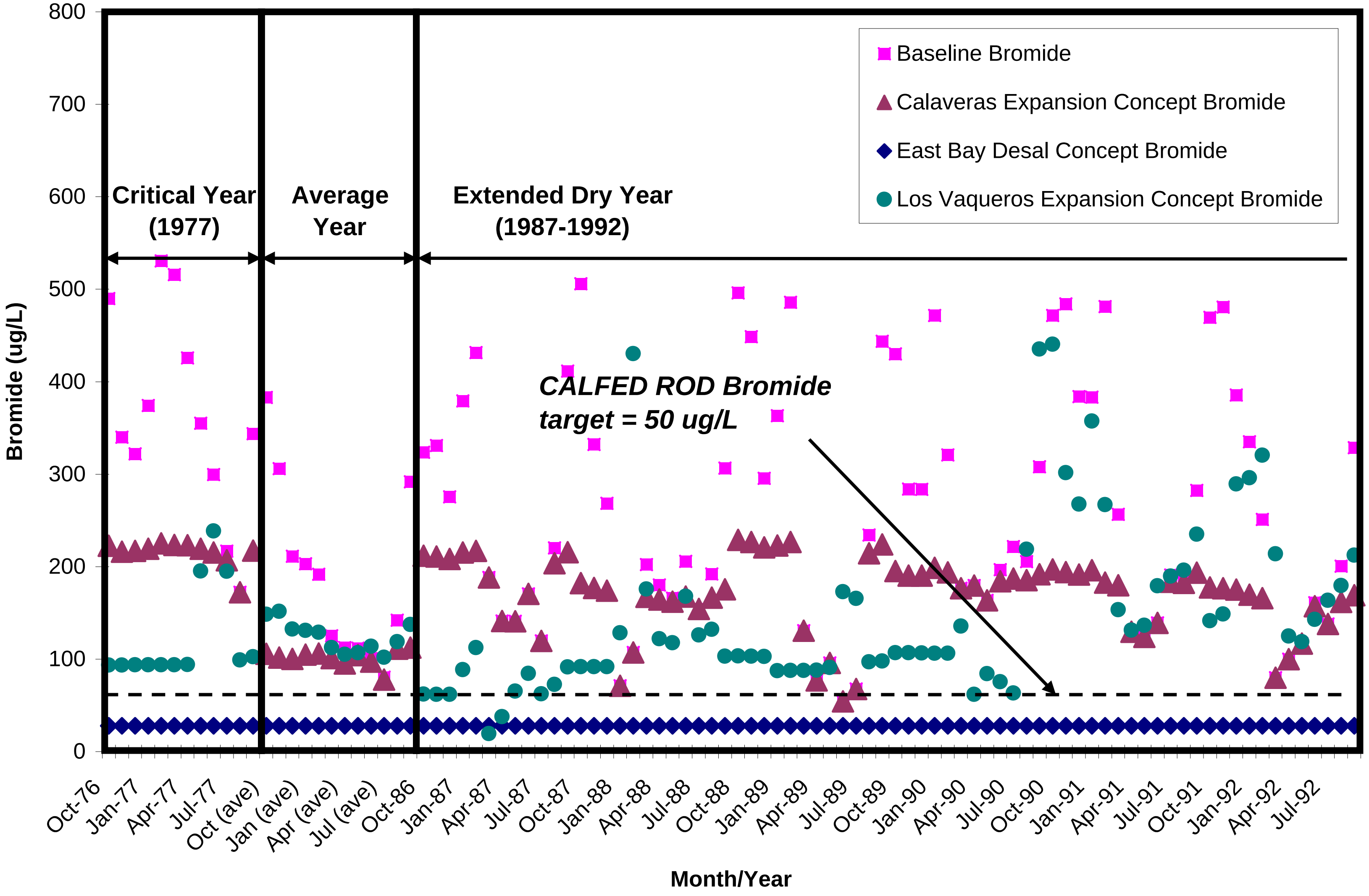
Table G17-4 - Environmental Score Card (Page 5 of 5)

Performance	Concept	Concept Rating
Energy Consumption		
Potential Increases in Energy Consumption (amount of energy required for facility operation) Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD**[1]. The energy requirement associated with concept operation is not known. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD**[1]. More information would be required to identify potential effects and mitigation opportunities.
	Calaveras Reservoir Expansion - Water Quality	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD**[1]. The energy requirement associated with concept operation is not known. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD**[1]**.** More information would be required to identify potential effects and mitigation opportunities.
	East Bay Saline Groundwater Desalination	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD**[1]**.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant and related facilities. Hetch Hetchy hydropower (via the Newark Substation) would provide energy to operate concept facilities. The energy demand for operation is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD**[1]**.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
	Los Vaqueros Reservoir Expansion	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** The proposed concept would consume 183 million kwh of energy. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants.
	Mirant Desalination with Water Quality Element	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.

1. To be determined in future studies.

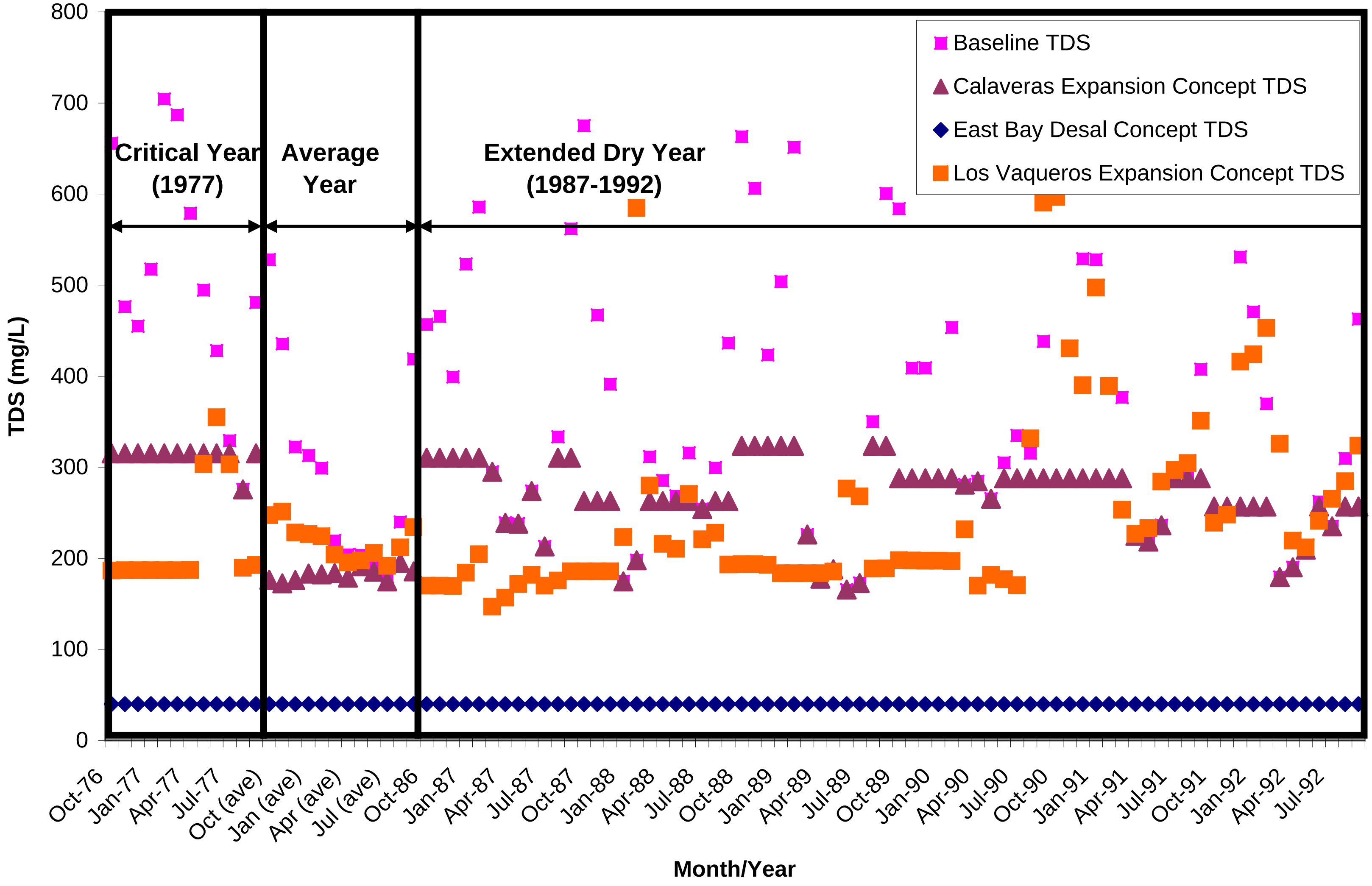
ACWD: Comparison of Concepts

Comparison of ACWD Baseline Source Water with Concept Bromide



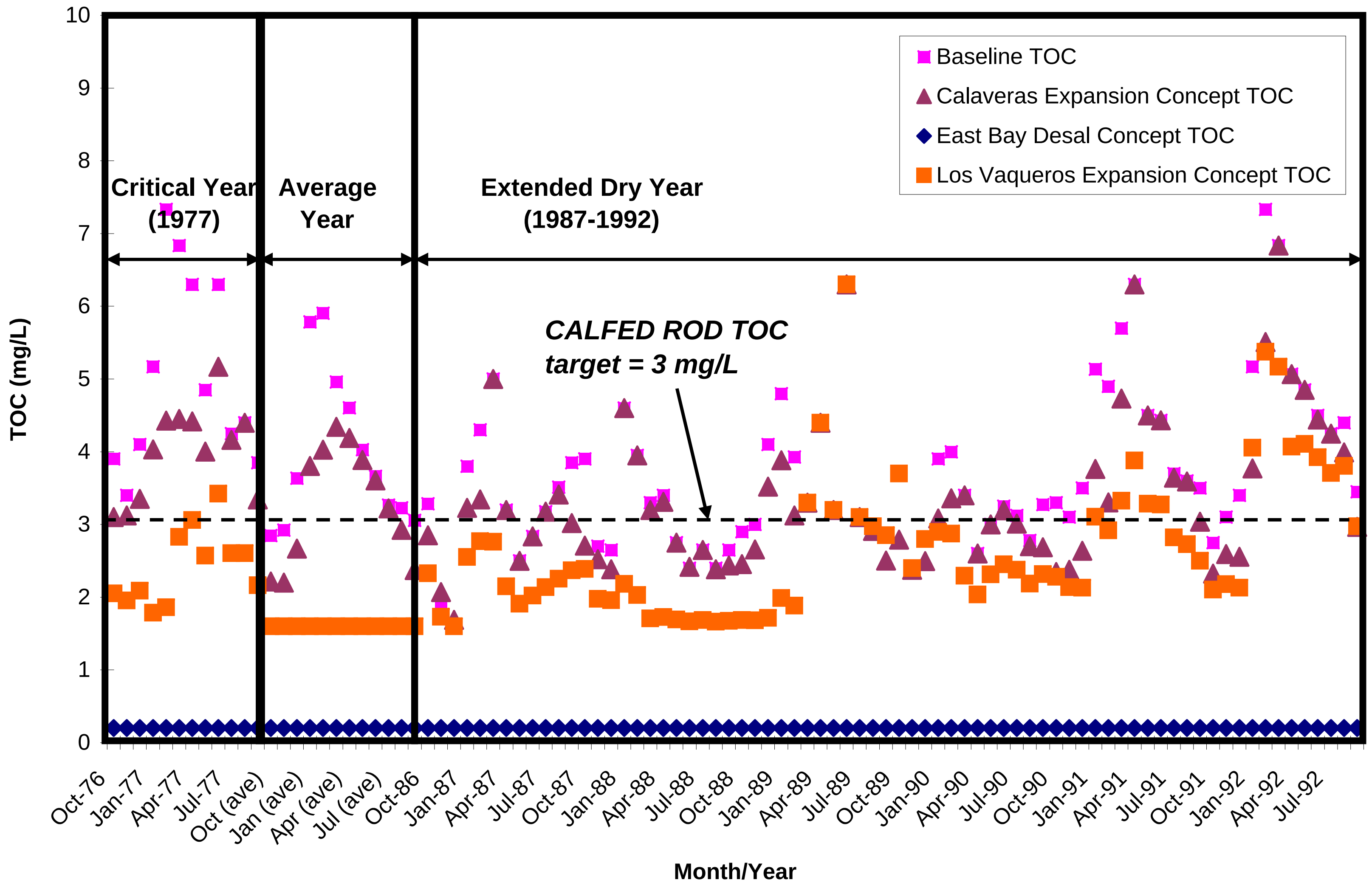
ACWD: Comparison of Concepts

Comparison of ACWD Baseline Source Water TDS with Concept TDS



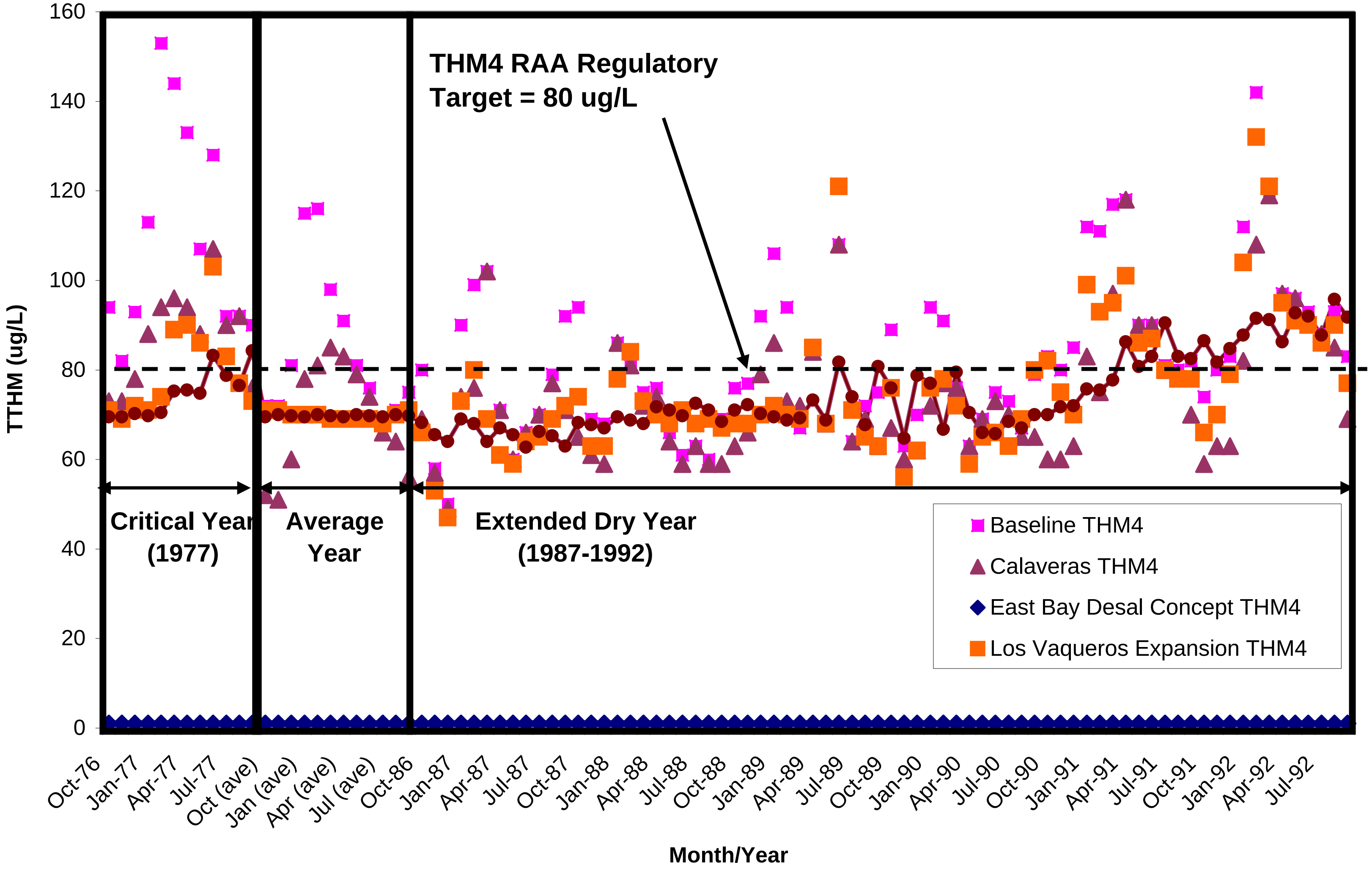
ACWD: Comparison of Concepts

Comparison of ACWD Baseline Source Water TOC with Concept TOC

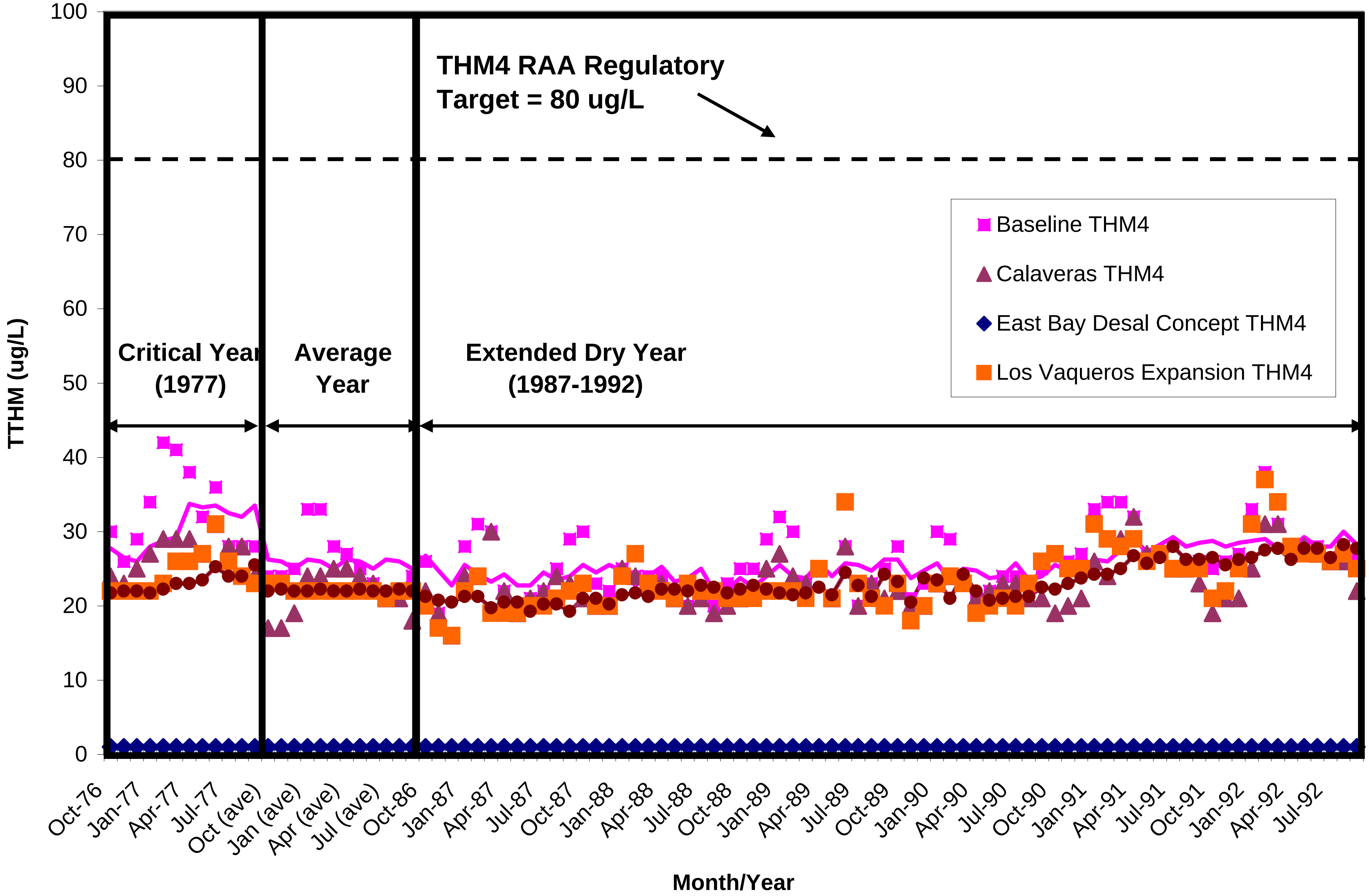


ACWD: Comparison of Concepts

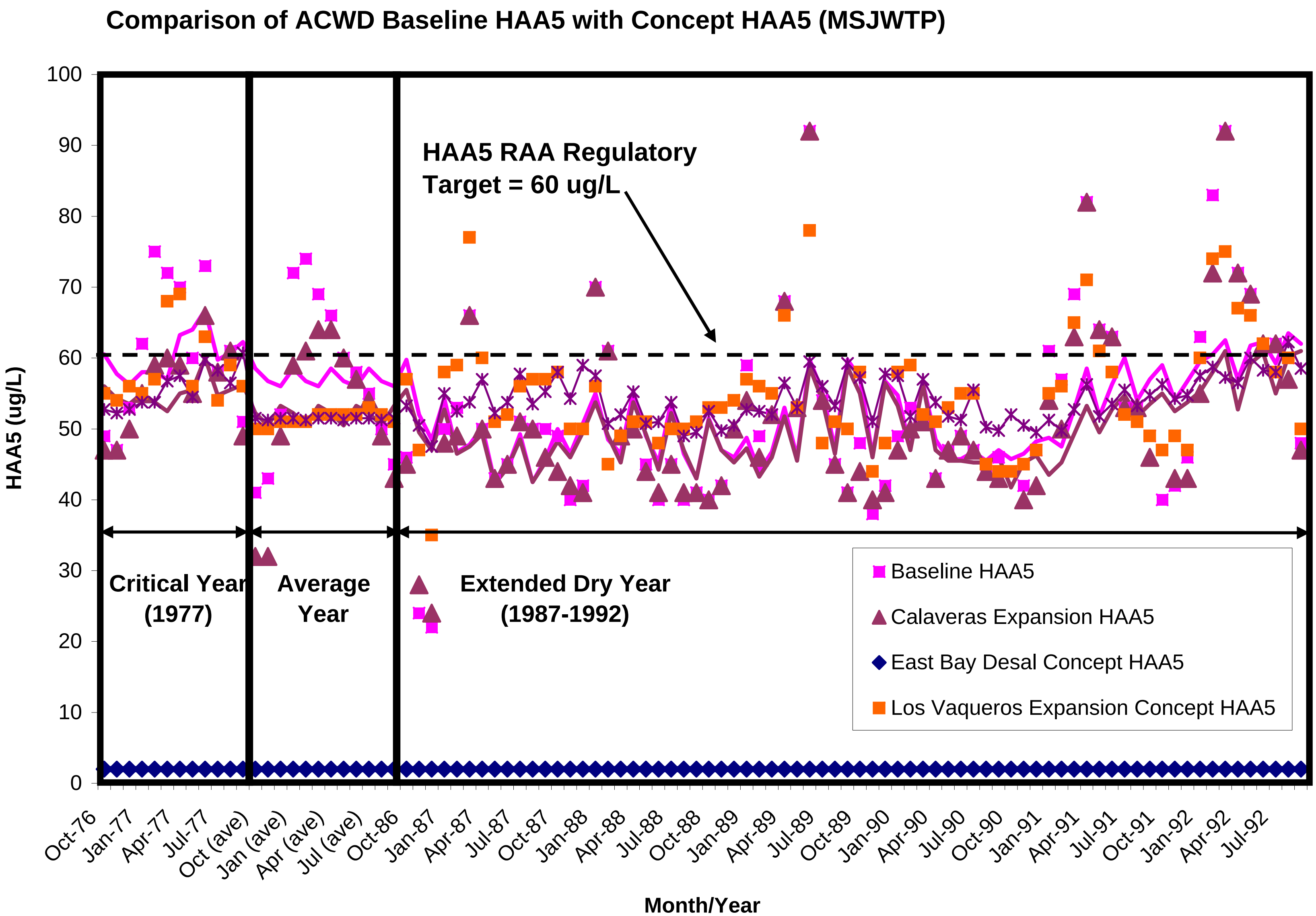
Comparison of ACWD Baseline Source Water THM4 with Concept THM4 (MSJWTP)



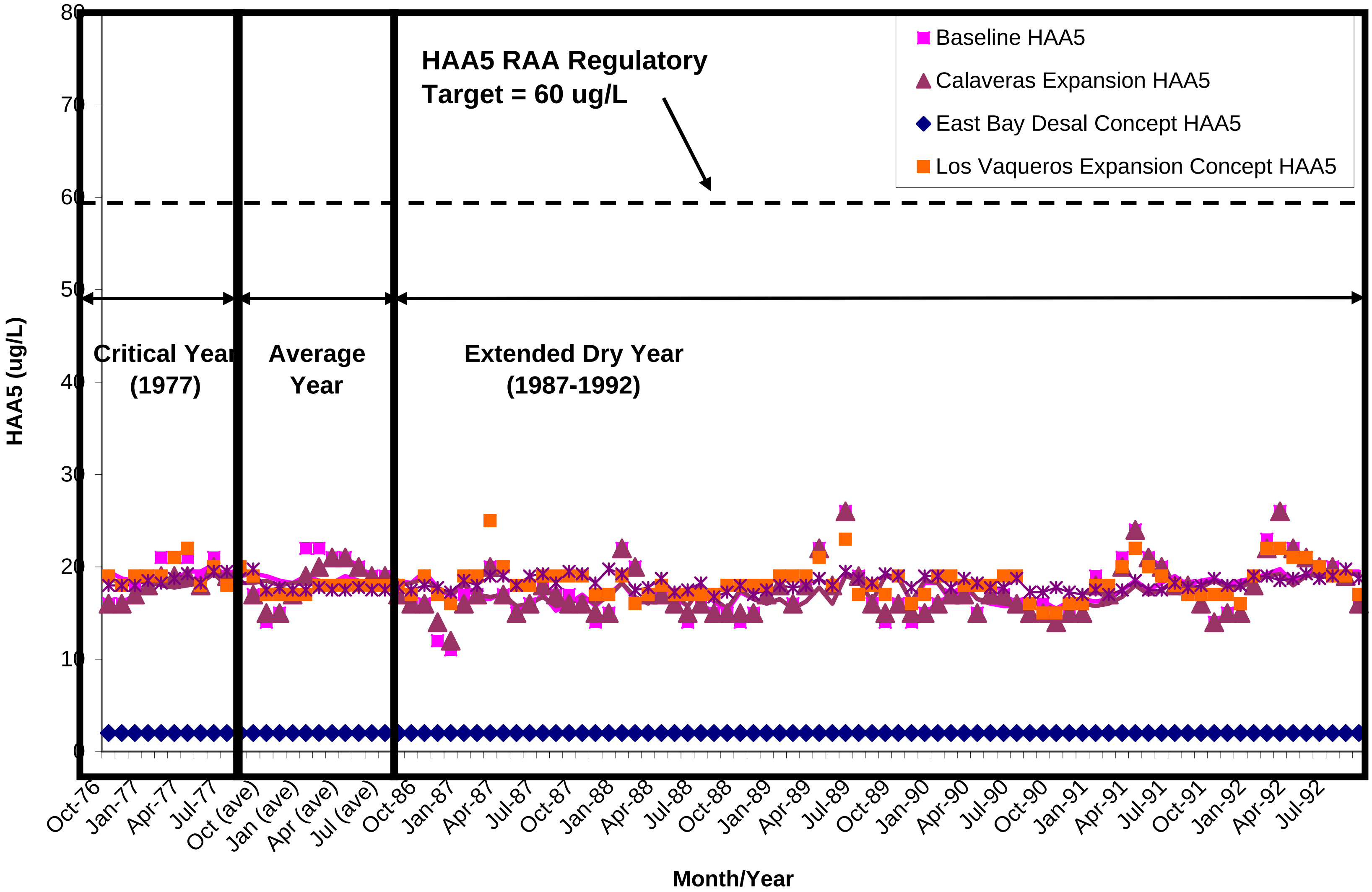
Comparison of ACWD Baseline Source Water THM4 with Concept THM4 (WTP2)



ACWD: Comparison of Concepts



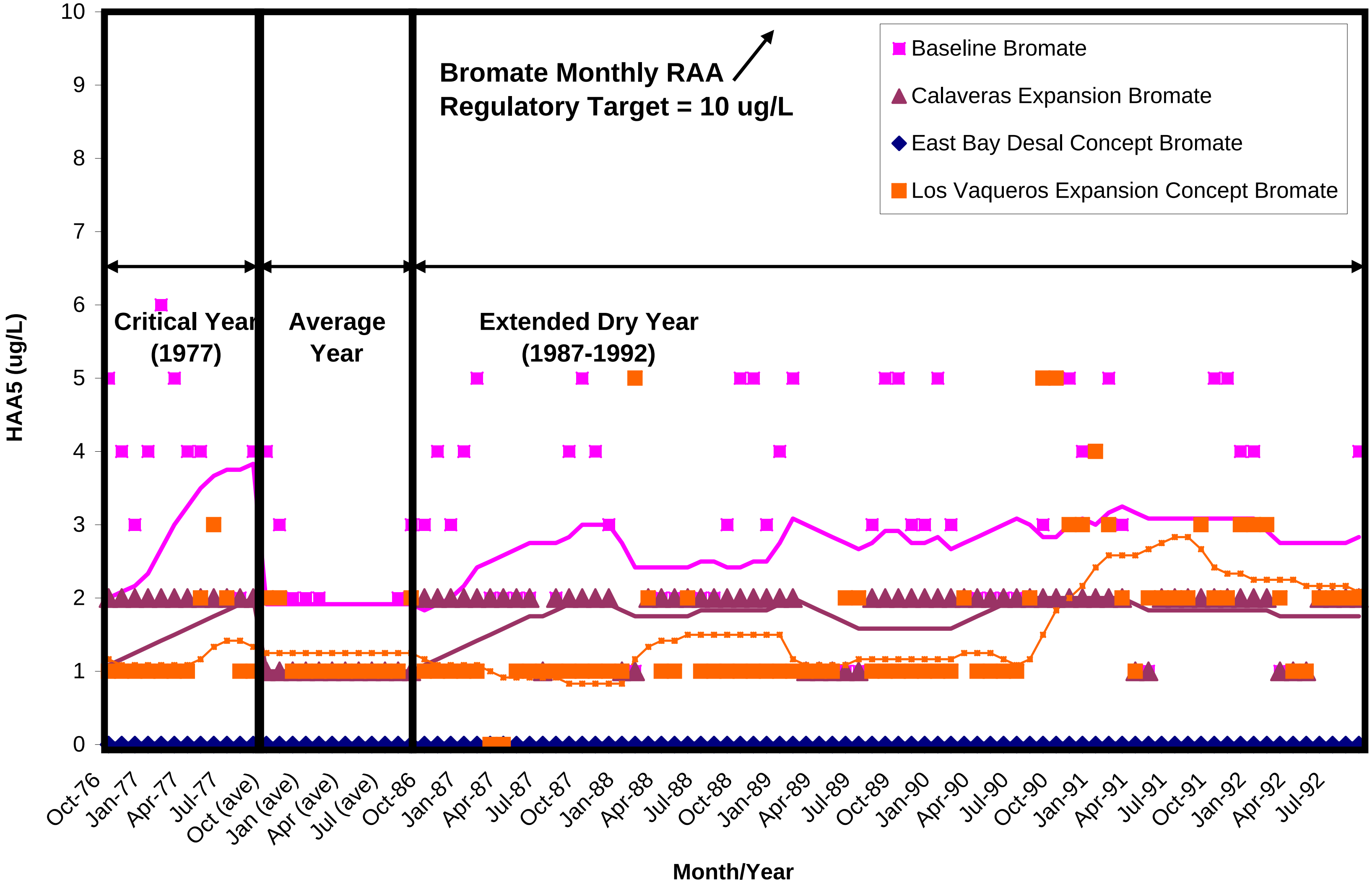
ACWD: Comparison of Concepts



Comparison of ACWD Baseline HAA5 with Concept HAA5 (WTP2)

ACWD: Comparison of Concepts

Comparison of ACWD Baseline Bromate with Concept Bromate (WTP2)



G18 BAWSCA Concepts

G18 Bay Area Water Supply and Conservation Agency: All Concepts

DESCRIPTION

Bay Area Water Supply and Conservation Agency (BAWSCA) is a potential beneficiary for the following concepts:

- Calaveras Reservoir Expansion (as San Francisco Public Utilities Commission [SFPUC] wholesale customers)
- East Bay Saline Groundwater Desalination project
- Regional Desalination project (as SFPUC wholesale customers)
- South Bay Desalination
- Enhanced Conservation
- Recycled Water Concepts

The attached scorecard summarizes information for four of these five concepts. Enhanced conservation is not included on the scorecard because no specific conservation thresholds have been established.

Each of the concepts and the potential benefits are summarized below.

BAWSCA Concepts Summary

Calaveras Reservoir Expansion	
Average Year Water Quality	0 AFY
Dry Year Supply Reliability	41,000 to 53,000 AFY
Regional Desalination Project	
Average Year Water Quality	TBD in future studies
Dry Year Supply Reliability	TBD in future studies
East Bay Saline Groundwater Desalination	
Average Year Water Quality	Up to 16,000 AFY
Dry Year Supply Reliability	Up to 16,000 AFY
South Bay Desalination (Potable or Irrigation)	
Potable Average Year Water Quality	13,000 AFY
Potable Dry-Year Supply Reliability	8,000 AFY
Irrigation Supply, All Years	3,000 AFY
Enhanced Conservation	
Supply, All Years	TBD in future studies
Recycled Water Concepts	
Supply, All Years	Up to 35,800 AFY

❑ *Calaveras Reservoir Expansion*

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 acre-feet (AF) up to 420,000 AF. An SFPUC study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. The Bay Area Water Quality and Supply Reliability Program (BAWQ&SRP) is evaluating potential facilities that would be required and operating scenarios that could be implemented if the reservoir were expanded to 420,000 AF. These scenarios and facilities are presented for illustrative purposes only.

Two operational scenarios are being considered for the Calaveras Reservoir expansion: 1) a water quality and dry-year supply reliability operational scenario, where up to 50,000 acre-feet per year (AFY) would be delivered to South Bay Aqueduct (SBA) contractors Alameda County Water District (ACWD) and Santa Clara Valley Water District (SCVWD) during average years, via a new connection to the SBA, and up to 41,000 AFY could be delivered to SFPUC (retail and wholesale customers), ACWD and SCVWD in dry years; and 2) a dry-year supply reliability scenario in which SFPUC (retail and wholesale customers), ACWD and SCVWD would potentially receive up to 53,000 AFY.

❑ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, which will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are Contra Costa Water District (CCWD), East Bay Municipal Utility District (EBMUD), SFPUC, and SCVWD. The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

South Bay Desalination Concept (Potable or Irrigation Supply)

The South Bay Desalination concept could involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer. The upper aquifer is currently only used for small local domestic or agricultural purposes, or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control plant (WQCP) in Palo Alto. Each of these plants is assumed to have an intake capacity of up to 5 MGD. The end use for the desalinated supply could be for non-potable irrigation and industrial use, or for potable use. Two different target supply and water quality ranges have been selected, corresponding to the alternatives for end use. The intake capacity of 5 MGD is assumed for potable supply. However, due to recycled water supplies available for irrigation and industrial uses, demand for these purposes is lower, and production capacity is assumed to be 1 MGD per plant.

Potable supply projects at all three sites would have a potential dry-year supply benefit of up to 13,800 AFY and an average year water quality benefit of up to 8,300 AFY. Water quality benefits were only assumed for concepts that could potentially offset SCVWD surface water or groundwater. Irrigation supply projects at all three sites would have a potential supply benefit of up to 3,200 AFY in all years.

Enhanced Conservation

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

Water Recycling

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SRP. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

BAWSCA is a potential beneficiary for eleven recycled water concepts with a total yield of 35,800 AFY

- Alameda County Water District-Union Sanitary District (ACWD-USD) Recycled Water Feasibility Study Project (1,700 AFY)
- Burlingame Recycled Water Project (4,400 AFY)
- Coastside County Water District Recycled Water Project (580 AFY)
- Expanded South Bay Water Recycling Program (16,800 AFY)
- Millbrae Recycled Water Project (1,100 AFY)
- North Coast County Water District/Pacifica Recycled Water Project (200 AFY)
- Palo Alto Recycled Water Project (1,800 AFY to 4,700 AFY)
- Palo Alto Regional Water Quality Control Plant/Mountain View Recycled Water Project (1,500 AFY to 1,900 AFY)
- Redwood City/South Bayside System Authority Recycled Water Project (1,960 AFY)
- Stanford University Recycled Water Project (100 AFY to 1,100 AFY)
- Sunnyvale Recycled Water Project (1,500 AFY)

Table G18-1 - Supply Reliability Score Card

	Agency Baseline[1]		Concept[2,3]		Agency Baseline Plus Concept[2,3]		
Concept or Example Portfolio	**Amount or Description**	**Units**	**Amount or Description**	**Units**	**Amount or Description**	**Units**	**Notes/Other**
Meet Demand							
Critical Drought							For the South Bay Desal project, projected desalinated supplies have not been partitioned to potential beneficiaries as part of this project. Recipients include the City of Palo Alto, the City of Santa Clara, and the San Jose Municipal System. BAWSCA member agencies are potential beneficiaries of the Calaveras Reservoir Expansion and Regional Desalination Project as wholesale SFPUC customers.
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply[4]	137,800	AFY	Up to 53,000	AFY	Up to 190,800	AFY	
Calaveras Reservoir Expansion - Water Quality[4]	137,800	AFY	Up to 41,000	AFY	Up to 178,800	AFY	
East Bay Saline Groundwater Desalination	137,800	AFY	Up to 16,000	AFY	Up to 153,800	AFY	
Los Vaqueros Reservoir Expansion	N/A	AFY	N/A	AFY	N/A	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Regional Desalination Project[4]	137,800	AFY	TBD[1]	AFY	TBD[1]	AFY	
South Bay Desalination - Irrigation Use	137,800	AFY	Up to 3,200	AFY	Up to 141,000	AFY	
South Bay Desalination - Potable Use	137,800	AFY	Up to 13,800	AFY	Up to 151,600	AFY	
Water Recycling	137,800	AFY	Up to 35,836	AFY	137,800	AFY	
Extended Drought							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply[4]	209,900	AFY	Up to 53,000	AFY	Up to 262,900	AFY	
Calaveras Reservoir Expansion - Water Quality[4]	209,900	AFY	Up to 41,000	AFY	Up to 250,900	AFY	
East Bay Saline Groundwater Desalination	209,900	AFY	Up to 16,000	AFY	Up to 225,900	AFY	
Los Vaqueros Reservoir Expansion	N/A	AFY	N/A	AFY	N/A	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Regional Desalination Project[4]	209,900	AFY	TBD[1]	AFY	TBD[1]	AFY	
South Bay Desalination - Irrigation Use	209,900	AFY	Up to 3,200	AFY	Up to 213,100	AFY	
South Bay Desalination - Potable Use	209,900	AFY	Up to 13,800	AFY	Up to 223,700	AFY	
Water Recycling	209,900	AFY	Up to 35,836	AFY	209,900	AFY	
Average Year							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply[4]	345,000	AFY	0	AFY	345,000	AFY	
Calaveras Reservoir Expansion - Water Quality[4]	345,000	AFY	0	AFY	345,000	AFY	
East Bay Saline Groundwater Desalination	345,000	AFY	Up to 16,000	AFY	345,000	AFY	
Los Vaqueros Reservoir Expansion	N/A	AFY	N/A	AFY	N/A	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Regional Desalination Project[4]	345,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
South Bay Desalination - Irrigation Use	345,000	AFY	Up to 3,200	AFY	345,000	AFY	
South Bay Desalination - Potable Use	345,000	AFY	Up to 8,300	AFY	345,000	AFY	
Water Recycling	345,000	AFY	Up to 35,836	AFY	345,000	AFY	
Vulnerability							
Concept							
Bay Area Use of the Freeport Regional Water Project	Delta supply sources susceptible to liquefaction of Delta levees.		N/A				
Calaveras Reservoir Expansion - Water Supply[4]			Reduces Vulnerability - Reduction in vulnerability resulting from reduced vulnerability of SCVWD and SFPUC systems.				
Calaveras Reservoir Expansion - Water Quality[4]			Reduces Vulnerability - Reduction in vulnerability resulting from reduced vulnerability of SCVWD and SFPUC systems.				
East Bay Saline Groundwater Desalination			Reduces Vulnerability - Provides alternate source of supply if Irvington Tunnel were interrupted. Located West of				
Los Vaqueros Reservoir Expansion			N/A				
Mirant Desalination with Water Quality Element			N/A				
Near Bay Bridge Desalination with Water Quality Element			N/A				
Regional Desalination Project[4]			TBD[1]				
South Bay Desalination - Irrigation Use			Reduces Vulnerability - Could provide small supply source in the event of a supply disruption.				
South Bay Desalination - Potable Use			Reduces Vulnerability - Could provide small supply source in the event of a supply disruption.				
Water Recycling			No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems of potential participating agencies.				
Self-Sufficiency within the Region							
Concept							
Bay Area Use of the Freeport Regional Water Project	N/A						
Calaveras Reservoir Expansion - Water Supply[4]	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
Calaveras Reservoir Expansion - Water Quality[4]	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
East Bay Saline Groundwater Desalination	Increases Self-Sufficiency within the Region - Project would be locally controlled.						
Los Vaqueros Reservoir Expansion	N/A						
Mirant Desalination with Water Quality Element	N/A						
Near Bay Bridge Desalination with Water Quality Element	N/A						
Regional Desalination Project[4]	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled.						
South Bay Desalination - Irrigation Use	Increases Self-Sufficiency within Region - Project would be locally controlled.						
South Bay Desalination - Potable Use	Increases Self-Sufficiency within the Region - Project would be locally controlled.						
Water Recycling	Increases Self-Sufficiency within Region. Concepts will be owned, operated, and controlled locally.						

1. BAWSCA Agency supply quantities include ACWD supplies, as well as SFPUC and SCVWD supplies to BAWSCA agencies. Only average year BAWSCA agency supply quantities include local sources of supply.
2. Supply quantities and allocations for the RDP facility(ies) are to be determined by the RDP, and are not included in these numbers.
3. Some agencies include recycled water supplies in future supply projections. As a result, recycled water has not been considered as an additional supply, and does not result in an increased total supply as compared to baseline.
4. BAWSCA agencies are potential beneficiaries as SFPUC wholesale customers.

Table G18-2 - Public Health Protection Scorecard (Page 1 of 2)

	Concept		**Agency Baseline Plus Concept**		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus BAWSCA Source Water**	**Concept Plus BAWSCA Treated Water**	**Notes**
Variability for Treatment					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply[1]	NA	NA	NA	NA	BAWSCA Agencies receive treated supplies.
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	NA	BAWSCA Agencies receive treated supplies.
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	No effect on untreated water quality of current plants
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project[1]	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
South Bay Desalination - Potable Use	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Total Dissolved Solids					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply[1]	NA	NA	Reduces TDS	NA	Reduction in TDS with respect to SBA supply, minimal effect with respect to SFPUC supply
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	Reduces TDS	NA	Reduction in TDS with respect to SBA supply, minimal effect with respect to SFPUC supply
East Bay Saline Groundwater Desalination	Reduces TDS	Reduces TDS	NA	NA	Reduced TDS for customers receiving East Bay Saline Groundwater Desalinated water
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project[1]	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will be substantially higher in TDS (up to 500 mg/L) than potable supplies, but will have no effect on potable water quality.
South Bay Desalination - Potable Use	NA	No Effect on TDS	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS.
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Disinfection By-Products					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply[1]	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
East Bay Saline Groundwater Desalination	Reduces DBPs	Reduces DBPs	NA	NA	Improved overall quality
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project[1]	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will likely be lower in DBPs than potable supplies, due to lower chlorine demand from RO treatment, but will have no effect on potable water quality.
South Bay Desalination - Potable Use	NA	Reduces DBPs	NA	NA	Desalinated supplies for potable use will be significantly lower in DBPs than usual supplies, due to lower chlorine demand.
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		

1. BAWSCA agencies are potential beneficiaries as SFPUC wholesale customers.

2. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G18-2 - Public Health Protection Scorecard (Page 2 of 2)

	Concept		**Baseline Plus Concept**		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus BAWSCA Source Water**	**Concept Plus BAWSCA Treated Water**	**Notes**
Taste and Odor Problems (Excluding TDS)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply[1]	NA	NA	NA	Improves T&O	Improvement in overall water quality
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	Improves T&O	Improvement in overall water quality
East Bay Saline Groundwater Desalination	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project[1]	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will not be potable.
South Bay Desalination - Potable Use	NA	No Effect on T&O	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Desalinated supplies will have significantly lower TOC than usual supplies, but higher chloride than Hetch Hetchy.
Water Recycling	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply[1]	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
East Bay Saline Groundwater Desalination	NA	NA	Reduces Potential for Degradation	NA	East Bay Saline Groundwater Desalination treated water quality is comparable to SFPUC water quality (improved quality compared to SBA source).
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project[1]	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	Increases Potential for Degradation	Increases Potential for Degradation	NA	NA	Increased TDS in desalinated supplies displacing potable supplies used for the same purpose could have effects on the groundwater salt balance.
South Bay Desalination - Potable Use	NA	No Effect on Potential for Degradation	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Bromide levels will be well below SCVWD averages, and a significant reduction in TOC is expected. No water quality degradation is projected.
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply[1]	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
East Bay Saline Groundwater Desalination	NA	NA	No Effect on Potential for Degradation	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project[1]	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	No Effect on Potential for Degradation	Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
South Bay Desalination - Potable Use	NA	Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
Water Recycling	Increases Potential for Degradation	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with advanced treatment, emerging contaminants including NDMA and pharmaceuticals may be introduced into the groundwater basin due to usage of recycled water.		

1. BAWSCA agencies are potential beneficiaries as SFPUC wholesale customers.

2. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G18-3 - Cost, Environmental and Implementation Score Card (Page 1 of 3)

Performance Measure/Objective	Concept	Concept	Amount or Rating	Notes/Other
Cost Impacts				
Cost Impacts	Bay Area Use of the Freeport Regional Water Project	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Supply[2]	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing station. Pumping costs estimated as $3.5 M/year. All costs in $2003. Operating costs and annualized costs to be determined as part of future SFPUC studies.
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Calaveras Reservoir Expansion - Water Quality[2]	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing station. Pumping costs estimated as $3.5 M/year. All costs in $2003. Operating costs and annualized costs to be determined as part of future SFPUC studies.
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	East Bay Saline Groundwater Desalination	Capital Cost	TBD[1]	Capital costs associated with the desalination on-site facilities are projected to be $75 million ($2005). Capital costs of ancillary facilities and conveyance, operating and life-cycle costs to be determined as part of future studies.
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Los Vaqueros Reservoir Expansion	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Mirant Desalination with Water Quality Element	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Near Bay Bridge Desalination with Water Quality Element	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Regional Desalination Project[2]	Capital Cost	TBD[1]	Specific capital costs, operating costs and lifecycle costs will depend on location and operation of facilities. The Regional Desalination Project Phase 1 report included capital costs ($2003) ranging from $168M to $285M for a 40-MGD plant at each of the three sites considered, and $466M for a 120-MGD facility at the Mirant site. O&M costs ($2003) were estimated at $17M to $38M per year for a 40-MGD plant at each of the sites considered, and $51M per year for a 120-MGD facility at the Mirant site.
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	TBD[1]	
	South Bay Desalination - Irrigation Use	Capital Cost	$14 - $17 M	Conceptual-level capital costs are estimated at $14 - 17M, depending on finished water quality. Operational costs estimated at $2.6 M/year. Lifecycle costs are projected to be approximately $3.6 - $3.8 M/year. Unit costs are $1,100/AF.
		Operating & Maintenance Cost	$2.6 M/Year	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	$3.6 - $3.8 M	
		Allocation of Costs	N/A	
	South Bay Desalination - Potable Use	Capital Cost	$41 - $138 M	Conceptual-level capital costs are estimated at $41 - 138M, depending on finished water quality. Operational costs estimated at $8.8 - $9.5 M/year. Lifecycle costs are projected to be approximately $12.4 - $18.8 M/year. Unit costs are $860 - $1,390/AF/yr.
		Operating & Maintenance Cost	$8.8 - $9.5 M/Yr	
		Environmental Mitigation Cost	Included in capital cost	
		Lifecycle Cost	$12.4 - $18.8 M/Yr	
		Allocation of Costs	N/A	
	Water Recycling	Capital Cost	Up to $503 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
		Operating & Maintenance Cost	Up to $11.8 M/Yr	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	Up to $48 M/Yr	
		Allocation of Costs	Up to $1,581/AF	

1. To be determined in future studies.
2. BAWSCA agencies are beneficiaries as wholesale customers of the SFPUC.

Table G18-3 - Cost, Environmental and Implementation Score Card (Page 2 of 3)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Impacts to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply[2]	**Overall Impacts to the Environment (Before Mitigation): High Impact.** Potential effects are primarily associated with aquatic and terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land and water resources. In addition, other facility development could also affect sensitive biological resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts in and around the watershed at a 3:1 ratio or at a ratio that is deemed appropriate by regulatory agencies.	
	Calaveras Reservoir Expansion - Water Quality[2]		
	East Bay Saline Groundwater Desalination	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the concept facilities would primarily consist of temporary, construction-related effects. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities to reduce construction and operation impacts include alternative siting of facilities to avoid sensitive resources to the extent feasible, preconstruction surveys (e.g., for special-status species), implementation of site-specific measures (e.g., monitoring during construction, use of exclusionary fencing, restoration), restriction on construction schedule (e.g., during breeding / nesting season of certain bird species if their nests are found nearby), etc. These mitigation measures would ensure that short-term effects are reduced.	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project[2]	TBD[3] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the concept facilities would primarily consist of temporary construction-related effects. Siting of facilities (e.g., groundwater wells) may result in direct effects to sensitive resources depending on the location. No long-term operational effects are expected if brine discharge complies with existing NPDES permit. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
Overall Benefits to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply[2]	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** No benefits to the environmental are expected from the construction and operation of this concept prior to mitigation. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Protection, restoration, and enhancement of habitat for plants and wildlife species would be considered a benefit since the acreage protected, restored, or enhanced would likely exceed that affected by concept implementation.	
	Calaveras Reservoir Expansion - Water Quality[2]		
	East Bay Saline Groundwater Desalination	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Implementation of this concept would slightly reduce pumping from the Delta, and thus would be considered an environmental benefit to Delta resources. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would unlikely result in additional benefits to the environment.	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project[2]	TBD[3] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source (Santa Clara – Pico Power Plant Site only) to offset SCVWD during normal years reduces spring and summer pumping from the Delta, there would be a benefit to the Delta. Incremental benefits to the environment from implementation of the concept at the other sites are not expected. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** The potential benefits associated with the proposed concepts include offsetting the development of higher capacity water supply projects. This translates to a potential reduction in environmental impacts associated with the construction and operation of larger water-related facilities. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. BAWSCA agencies are potential beneficiaries as SFPUC wholesale customers.
3. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G18-3 - Cost, Environmental and Implementation Score Card (Page 3 of 3)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Implementation Potential			
External Support	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply[1]	TBD[2] - Historically, use of desalination, water recycling and enhanced conservation rather than storage concepts have been viewed as environmentally friendly alternatives and generated more support than storage projects.	
	Calaveras Reservoir Expansion - Water Quality[1]		
	East Bay Saline Groundwater Desalination	TBD[2] - Use of desalination, water recycling and enhanced conservation rather than storage concepts is likely to be viewed as an environmentally friendly alternative and generate external support.	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project[1]	TBD[2] - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	TBD[2] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
	South Bay Desalination - Potable Use		
	Water Recycling	TBD[2] - Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.	
Ability to Get Outside Funding	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply[1]	TBD[2]	
	Calaveras Reservoir Expansion - Water Quality[1]		
	East Bay Saline Groundwater Desalination	TBD[2] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation rather than storage concepts, as well as the large number of benefiting agencies, has historically increased the likelihood of external funding.	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project[1]	TBD[2] - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	TBD[2] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
	South Bay Desalination - Potable Use		
	Water Recycling	TBD[2] - The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds.	
Consistency with Local and Regional Plans	All concepts	NA - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective			
Number of Agencies Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply[1]	3	ACWD, SCVWD, SFPUC (retail and wholesale customers)
	Calaveras Reservoir Expansion - Water Quality[1]		
	East Bay Saline Groundwater Desalination	2	ACWD, SFPUC
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project[1]	TBD[2]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	3	BAWSCA, SFPUC, SCVWD
	South Bay Desalination - Potable Use		
	Water Recycling	6,000,000 people	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply[1]	4,700,000 people	
	Calaveras Reservoir Expansion - Water Quality[1]	4,700,000 people	
	East Bay Saline Groundwater Desalination	2,200,000 people	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	NA	
	Near Bay Bridge Desalination with Water Quality Element	NA	
	Regional Desalination Project[1]	TBD[2]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	3,700,000 people	
	South Bay Desalination - Potable Use		
	Water Recycling	6,000,000 people	

1. BAWSCA agencies are potential beneficiaries as SFPUC wholesale customers.
2. To be determined in future studies.

Table G18-4 - Environmental Score Card (Page 1 of 2)

Measure/Objective	Concept	Concept Rating
Aquatic Environment		
Potential Impacts to Aquatic Environment	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply[1]	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could then affect habitat for fish. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this would require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions). In addition, continue trout planting.
	Calaveras Reservoir Expansion - Water Quality[1]	
	East Bay Saline Groundwater Desalination	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources). Effects on aquatic resources from brine discharge are not expected if brine is mixed and diluted with wastewater prior to discharge (e.g., use of EBDA facilities). Construction of concept facilities (desal plant, wells, and pipeline) would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Los Vaqueros Reservoir Expansion	NA
	Mirant Desalination with Water Quality Element	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Project[1]	**TBD**[2] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources) and brine would be combined with WQCP effluent or power plant blow-down water (to allow for mixing and dilution prior to discharge). Construction of concept facilities (desal plant, wells, and pipeline) could result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply[1]	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Direct effects from inundation of terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and an area of potential serpentine associated plants. Additional disturbed acreage associated with construction of other facilities (e.g., pipeline, pump station). **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed. In addition, consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Restoration of affected habitat may occur at a 3:1 ratio, or as negotiated with regulatory agencies.
	Calaveras Reservoir Expansion - Water Quality[1]	
	East Bay Saline Groundwater Desalination	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The locations of concept facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, the location of these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new pipelines are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Los Vaqueros Reservoir Expansion	NA
	Mirant Desalination with Water Quality Element	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Project[1]	**TBD**[2] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual terrestrial effects cannot be defined or quantified. However, these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if other facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for each concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.

1. BAWSCA agencies are potential beneficiaries as SFPUC wholesale customers.
2. To be determined in future studies.

Table G18-4 - Environmental Score Card (Page 2 of 2)

Performance	Concept	Concept Rating
Wetlands		
Potential Impacts to Wetlands (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply[1]	**Effects on Wetlands (Before Mitigation): Impacts.** Direct effects to marsh habitat from inundation. Siting of other permanent facilities and construction of conveyance facilities may also affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities would be similar to those described above for Terrestrial Environment. Affected lands would be restored at a ratio deemed appropriate by regulatory agencies.
	Calaveras Reservoir Expansion - Water Quality[1]	
	East Bay Saline Groundwater Desalination	**Effects on Wetlands (Before Mitigation): Impacts.** A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of other facilities could temporarily affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
	Los Vaqueros Reservoir Expansior	NA
	Mirant Desalination with Water Quality Elemen	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Projec[1]	**TBD**[2] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Wetlands (Before Mitigation): Impacts.** As described above, the majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual biological effects cannot be defined or quantified. Other facilities would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may require replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply[1]	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply.
	Calaveras Reservoir Expansion - Water Quality[1]	
	East Bay Saline Groundwater Desalination	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. However, effects to wetlands may affect associated special status species, either from facility siting or construction. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities for wetlands would be the same as those identified above for Wetlands Resources. Protection of wetlands (or provision of additional wetlands) would protect special status wetland species.
	Los Vaqueros Reservoir Expansior	NA
	Mirant Desalination with Water Quality Elemen	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Projec[1]	**TBD**[2] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special-status species to a large extent. Any effects to special-status species would likely be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
Energy Consumption		
Potential Increases in Energy Consumption (amount of energy required for facility operation) Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply[1]	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD**[1]. The energy requirement associated with concept operation is not known. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions After Mitigation): TBD**[1]**.** More information would be required to identify potential effects and mitigation opportunities.
	Calaveras Reservoir Expansion - Water Quality[1]	
	East Bay Saline Groundwater Desalination	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant and related facilities. Hetch Hetchy hydropower (via the Newark Substation) would provide energy to operate concept facilities. The energy demand for operation is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions After Mitigation): TBD.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
	Los Vaqueros Reservoir Expansior	NA
	Mirant Desalination with Water Quality Elemen	NA
	Near Bay Bridge Desalination with Water Quality Element	NA
	Regional Desalination Projec[1]	**TBD**[2] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases** Energy consumption would differ for each facility, depending on individual capacities. Generally, energy requirements would be 3,250 kwh/mg of water (CDM, 2004). The energy demand of an individual desal facility is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases** Mitigation opportunities have not been identified to reduce the increase in energy usage.
	South Bay Desalination - Potable Use	
	Water Recycling	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.

1. BAWSCA agencies are potential beneficiaries as SFPUC wholesale customers.
2. To be determined in future studies.

G19 CCWD Concepts

G19 Contra Costa Water District: All Concepts

DESCRIPTION

Contra Costa Water District (CCWD) is a potential beneficiary for the following six concepts:

- Los Vaqueros Reservoir Expansion.
- Regional Desalination Project
- Mirant Desalination with Water Quality Element
- Near Bay Bridge Desalination with Water Quality Element
- Enhanced Conservation
- Recycled Water Concepts

The attached scorecard summarizes information for five of these concepts. Enhanced conservation is not included on the scorecards because no specific conservation thresholds have been established.

Each of the concepts and the potential benefits for CCWD are summarized below.

CCWD Concepts Summary

Los Vaqueros Reservoir Expansion
Average Year Water Quality.. 0 AFY
Dry Year Supply Reliability ....Up to 10,000 AFY

Regional Desalination Project
Average Year Water Quality.................... TBD in future studies
Dry Year Supply Reliability .... TBD in future studies

Enhanced Conservation
Supply, All Years.. TBD in future studies

Recycled Water Concepts
Supply, All Years...Up to 22,500 AFY

❑ *Los Vaqueros Reservoir Expansion*

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability Program (BAWQ&SRP), the multipurpose operating scenario for a 500,000 AF reservoir, with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the BAWQ&SRP as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are CCWD, Alameda County Water District (ACWD), Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

CCWD would receive supply reliability deliveries of 10,000 AFY in critical drought years, and 9,300 AFY in extended drought years. CCWD would not increase use of the reservoir in average years. However, there would be an improvement in water quality in many years because new diversion facilities would allow some diversions to be shifted from Rock Slough to Old and Middle River, which typically have lower salinities than Rock Slough.

❑ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, which will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are CCWD, East Bay Municipal District (EBMUD), SFPUC and SCVWD. The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 MGD product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

- ❑ ***Enhanced Conservation***

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

- ❑ ***Water Recycling***

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SRP. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

CCWD has three potential recycled water concepts with a total yield of 22,500 AFY:

- Central Contra Costa Sanitary District (CCCSD) Recycled Water Irrigation Projects (3,000 AFY)
- CCCSD Industrial Recycled Water Projects (17,900 AFY)
- Expanded Delta Diablo Sanitary District Recycled Water (1,600 AFY)

Table G19-1 - Supply Reliability Score Card

Concept or Example Portfolio	Agency Baseline Amount or Description	Units	Concept Amount or Description	Units	Agency Baseline Plus Concept Amount or Description	Units	Notes/Other
Meet Demand							
Critical Drought							The Los Vaqueros Reservoir Expansion results are reported for 500,000 AF reservoir with 1,750 cfs diversion, and both water quality and supply reliability objectives (Scenario 5A). For the Mirant Desalination Concept, CCWD could receive water via the Multi-purpose Pipeline. Specific plant locations, allocations or exchange between EBMUD and CCWD or with other partner agencies will be determined as part of the Regional Desalination Project. This concept, which is a variation on the RDP (and is not being evaluated in the RDP), evaluates only the Mirant site and includes potential average water quality deliveries to Zone 7, who is not a partner agency. For the Near Bay Bridge Desalination Concept, specific plant locations, allocations or exchange with other partner agencies will be determined as part of the RDP. This concept, which is a variation on the RDP (and is not being evaluated in the RDP), evaluates only the Near Bay Bridge site and includes potential average water quality deliveries to Zone 7, who is not an RDP partner agency.
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion[3]	176,800	AFY	10,000	AFY	186,800	AFY	
Mirant Desalination with Water Quality Element[1]	176,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element[1]	176,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	176,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	176,800	AFY	Up to 22,520	AFY	176,800	AFY	
Extended Drought							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion[3]	170,800	AFY	9,400	AFY	180,200	AFY	
Mirant Desalination with Water Quality Element[1]	170,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element[1]	170,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	170,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	170,800	AFY	Up to 22,520	AFY	170,800	AFY	
Average Year							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion[3]	139,400	AFY	0	AFY	139,400	AFY	
Mirant Desalination with Water Quality Element[1]	N/A	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element[1]	N/A	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	139,400	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	139,400	AFY	Up to 22,520	AFY	139,400	AFY	
Vulnerability							
Bay Area Use of the Freeport Regional Water Project	Delta supply sources susceptible to liquefaction of Delta levees and water quality problems.		N/A				
Calaveras Reservoir Expansion - Water Supply			N/A				
Calaveras Reservoir Expansion - Water Quality			N/A				
East Bay Saline Groundwater Desalination			N/A				
Los Vaqueros Reservoir Expansion			Reduces Vulnerability - Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or Sout				
Mirant Desalination with Water Quality Element			Reduces Vulnerability - This concept would provide additional reliability to CCWD by providing an additional supply downstream of Delta sources. As a treated water supply it could also replace a portion of the capacity of the Randall Bold Water Treatment				
Near Bay Bridge Desalination with Water Quality Element			TBD[3]				
Regional Desalination Project			TBD[4]				
South Bay Desalination - Irrigation Use			N/A				
South Bay Desalination - Potable Use			N/A				
Water Recycling			No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems of potential participating agencies.				
Self-Sufficiency within the Region							
Bay Area Use of the Freeport Regional Water Project	N/A						
Calaveras Reservoir Expansion - Water Supply	N/A						
Calaveras Reservoir Expansion - Water Quality	N/A						
East Bay Saline Groundwater Desalination	N/A						
Los Vaqueros Reservoir Expansion	Increases Self-Sufficiency within the Region - Under all institutional structures, CCWD would retain ownership and control of the watershed and operations of the project (CALFED, 2004). An ownership agreement would be developed outlining this. A governi						
Mirant Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would contro						
Near Bay Bridge Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would cont						
Regional Desalination Project	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled.						
South Bay Desalination - Irrigation Use	N/A						
South Bay Desalination - Potable Use	N/A						
Water Recycling	Increases Self-Sufficiency within Region - Concepts will be owned, operated, and controlled locally.						

1. Desalination with Water Quality Element concepts consist of average and wet year water quality deliveries to Zone 7, and are dependent upon the base desalination facility, which is part of the Regional Desalination Project. Shaded cells reflect potential benefits associated with the base desalination facility, to be determined by the Regional Desalination Project. Unshaded cells reflect incremental benefits associated with the concept (water quality element).
2. All RDP partners will benefit from the desalination facility in dry years. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.
3. Concept supply quantities reflect the incremental increase in deliveries from the enlarged reservoir, and do not include deliveries from the existing reservoir.

Table G19-2 - Public Health Protection Scorecard (Page 1 of 2)

	Concept		Agency Baseline Plus Concept		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus CCWD Source Water**	**Concept Plus CCWD Treated Water**	**Notes**
Variability for Treatment					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies (except slight increase in bromide in average years)
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Total Dissolved Solids					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Disinfection By-Products					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.

1. To be determined in future studies.

Table G19-2 - Public Health Protection Scorecard (Page 2 of 2)

	Concept		Baseline Plus Concept		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus CCWD Source Water**	**Concept Plus CCWD Treated Water**	**Notes**
Taste and Odor Problems (Excluding TDS)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	Improves T&O	Improvement in source water quality. Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	NA	NA	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	TBD[1]	TBD[1]	Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[1] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	Increases Potential for Degradation	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with adva

Table G19-2a - Public Health Protection Score Card by Agency

Concept: Los Vaqueros Reservoir Expansion

			Agency Baseline		**Quantity of Water Conveyed through the Expanded Reservoir[2]**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**CCWD Source Water**	**CCWD Treated Water[1]**	**Los Vaqueros Expansion Source Water**	**Los Vaqueros Expansion Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water[1]**	**Notes**
Supply Quantity									
Critical Year		AFY	176,800		10,000		186,800		
Extended Dry Year		AFY	170,800		9,400		180,200		
Average Year		AFY	139,400		0		139,400		
Minimize Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.22 - 0.66	0.16 - 0.58	NA	NA	0.15 - 0.39	0.10 - 0.31	
	Mean	mg/L	0.43	0.35	NA	NA	0.26	0.20	
TOC	Range	mg/L	2.6 - 5.4	1.8 - 4.2	NA	NA	3.1 - 6.1	2.2 - 4.8	
	Mean	mg/L	4.0	3.0	NA	NA	3.9	2.9	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.04 - 0.65	0.03 - 0.57	NA	NA	0.04 - 0.62	0.03 - 0.54	
	Mean	mg/L	0.25	0.20	NA	NA	0.19	0.14	
TOC	Range	mg/L	2.2 - 7.6	1.4 - 6.1	NA	NA	2.2 - 7.6	1.4 - 6.1	
	Mean	mg/L	3.8	2.7	NA	NA	3.7	2.7	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.07 - 0.27	0.05 - 0.22	NA	NA	0.06 - 0.22	0.03 - 0.17	
	Mean	mg/L	0.17	0.12	NA	NA	0.14	0.10	
TOC	Range	mg/L	2.7 - 6.3	1.8 - 4.9	NA	NA	2.7 - 6.4	1.8 - 5.0	
	Mean	mg/L	3.7	2.7	NA	NA	3.8	2.8	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Minimize Total Dissolved Solids									
Critical Year	Range	mg/L	334 - 856	355 - 877	NA	NA	245 - 532	266 - 554	
	Mean	mg/L	580	601	NA	NA	384	405	
Extended Dry Year	Range	mg/L	159 - 842	181 - 863	NA	NA	158 - 812	179 - 834	
	Mean	mg/L	370	392	NA	NA	299	321	
Average Year	Range	mg/L	176 - 398	198 - 419	NA	NA	168 - 331	189 - 352	
	Mean	mg/L	273	295	NA	NA	243	265	
Minimize Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	2 - 4	NA	NA	NA	1 - 2	
	Mean	ug/L	NA	2	NA	NA	NA	2	
THM4	Range	ug/L	NA	54 - 82	NA	NA	NA	55 - 84	
	Mean	ug/L	NA	68	NA	NA	NA	63	
HAA5	Range	ug/L	NA	19 - 26	NA	NA	NA	22 - 28	
	Mean	ug/L	NA	23	NA	NA	NA	24	
Extended Dry Year									
Bromate	Range	ug/L	NA	0.3 - 3	NA	NA	NA	ND - 3	
	Mean	ug/L	NA	1	NA	NA	NA	1	
THM4	Range	ug/L	NA	41 - 92	NA	NA	NA	42 - 87	
	Mean	ug/L	NA	60	NA	NA	NA	57	
HAA5	Range	ug/L	NA	18 - 33	NA	NA	NA	19 - 34	
	Mean	ug/L	NA	25	NA	NA	NA	25	
Average Year									
Bromate	Range	ug/L	NA	0.3 - 2	NA	NA	NA	0.3 - 1	
	Mean	ug/L	NA	1	NA	NA	NA	1	
THM4	Range	ug/L	NA	48 - 0	NA	NA	NA	44 - 75	
	Mean	ug/L	NA	57	NA	NA	NA	55	
HAA5	Range	ug/L	NA	21 - 31	NA	NA	NA	21 - 32	
	Mean	ug/L	NA	25	NA	NA	NA	26	
Minimize Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal likelihood	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Assumes 75% Bollman, 25% Randall Bold blend.
2. Concept supply quantities reflect the incremental increase in deliveries from the enlarged reservoir, and do not include deliveries from the existing reservoir.

Table G19-3 - Cost, Environmental and Implementation Score Card (Page 1 of 4)

Performance Measure/Objective	Concept	Concept	Amount or Rating	Notes/Other
Cost Impacts				
Cost Impacts	Bay Area Use of the Freeport Regional Water Project	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Supply	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Quality	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	East Bay Saline Groundwater Desalination	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Los Vaqueros Reservoir Expansion	Capital Cost	$1500M (2008 $)	Cost estimates from CALFED Los Vaqueros Expansion Studies (CALFED, 2004). Annual costs and potential cost-sharing options will be evaluated in future phases of the CALFED Los Vaqueros Reservoir Expansion studies.
		Operating & Maintenance Cost	$27.5M (2008 $)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Mirant Desalination with Water Quality Element[2]	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	Allocation of costs will not be performed as part of this study.
	Near Bay Bridge Desalination with Water Quality Element[2]	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Regional Desalination Project	Capital Cost	TBD[1]	Specific capital costs, operating costs and lifecycle costs will depend on location and operation of facilities. The Regional Desalination Project Phase 1 report included capital costs ($2003) ranging from $168M to $285M for a 40-MGD plant at each of the
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	TBD[1]	
	South Bay Desalination - Irrigation Use	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	South Bay Desalination - Potable Use	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Water Recycling	Capital Cost	Up to $69 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
		Operating & Maintenance Cost	Up to $2.8 M/Yr	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	Up to $8 M/Yr	
		Allocation of Costs	Up to $533/AF	

1. To be determined in future studies.
2. CCWD is a supply reliability beneficiary as an RDP partner.

Table G19-3 - Cost, Environmental and Implementation Score Card (Page 2 of 4)

Performance Measure/Objective	**Concept**	**Amount or Rating**	**Notes/Other**
Environmental Impacts[1]			
Overall Impacts to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	NA	
	Calaveras Reservoir Expansion - Water Quality	NA	
	Desalination	NA	
	Los Vaqueros Reservoir Expansion	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Potential effects are primarily associated with terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land. However, design of the facility would benefit aquatic resources, thus offsetting impacts to terrestrial resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts on existing watershed lands and lands owned by potential partner agencies or open space managers. In addition, acquisition of additional land for protection, restoration, and/or enhancement would occur. Mitigation acreage would range from 1,953 to 8,576 acres. Effects on recreation would be offset by the restoration and augmentation of trails (increase in 17 miles of trails).	
	Mirant Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Regional Desalination Project	**TBD**[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G19-3 - Cost, Environmental and Implementation Score Card (Page 3 of 4)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Benefits to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	NA	
	Calaveras Reservoir Expansion - Water Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	**Overall Benefits to the Environment (Before Mitigation): High Benefits.** Potential benefits associated with the proposed concept include the following: - Installation of state-of-the-art fish screens for diversions to the SBA, - Flexibility to shift the timing and location of water diversions to protect fish, - System flexibility to store and move water (including for environmental water storage); also, provision of additional storage (for natural disasters, toxic spills, or levee failures in the Delta). **Overall Benefits to the Environment (After Mitigation): High Benefits.** Benefits would then be associated with increased protected and restored land as well as additional recreation opportunities (see mitigation opportunities above).	
	Mirant Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Regional Desalination Project	TBD[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** The potential benefits associated with the proposed concepts include offsetting the development of higher capacity water supply projects. This translates to a potential reduction in environmental impacts associated with the construction and operation of larger water-related facilities. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential			
External Support	Bay Area Use of the Freeport Regional Water Project	NA	
	Supply	NA	
	Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	TBD[3]	
	Mirant Desalination with Water Quality Element	TBD[3] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
	Near Bay Bridge Desalination with Water Quality Element	TBD[3] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
	Regional Desalination Project	TBD[2] - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	TBD[2] - Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.
3. To be determined in future studies.

Table G19-3 - Cost, Environmental and Implementation Score Card (Page 4 of 4)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Implementation Potential			
Ability to Get Outside Funding	Bay Area Use of the Freeport Regional Water Project	NA	
	Supply	NA	
	Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	TBD^1 - Potential funding sources include any combination of federal (USBR), state (DWR) and local (Bay Area water agencies using the facilities).	
	Mirant Desalination with Water Quality Element	TBD^1 - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
	Near Bay Bridge Desalination with Water Quality Element	TBD^1 - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
	Regional Desalination Project	TBD^2 - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	TBD^2 - The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds.	
Consistency with Local and Regional Plans	All concepts	NA - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	
Regional Perspective			
Number of Agencies Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Supply	NA	
	Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	4	ACWD, CCWD, SCVWD, Zone 7, SFPUC
	Mirant Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Near Bay Bridge Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Regional Desalination Project	TBD^2	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	7	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Supply	NA	
	Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	4,400,000 people	
	Mirant Desalination with Water Quality Element	280,000 people	
	Near Bay Bridge Desalination with Water Quality Element	280,000 people	
	Regional Desalination Project	TBD^2	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	6,000,000 people	

Table G19-4 - Environmental Score Card (Page 1 of 3)

Performance	Concept	Concept Rating
Aquatic Environment		
Potential Impacts to Aquatic Environment	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Aquatic Environment (Before Mitigation). Benefits.** Reduces direct fish losses from water diversions (incremental increase in loss of juvenile fish at the new Delta intakes offset by a substantial reduction in direct fish loss at the SWP [or CVP] diversion facility), through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). **Effects on Aquatic Environment (After Mitigation): No Effect.** The concept was designed to minimize potential effects to aquatic environment. Thus, no mitigation measures would be required.
	Mirant Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 15,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges int adjacent water bodies.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 10,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges int adjacent water bodies.
	Regional Desalination Project	TBD[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Total direct effects from both reservoir expansion and facilities construction: - Total direct effects to terrestrial habitat of up to 2,595 acres (permanent and temporary). - 2,081 acres of grassland - 309 acres of oak woodland - 11 acres of chaparral / upland scrub - 0.01 acre of riparian - 3.6 acres of urban-ruderal - 189 acres of agriculture - 1,960 acres from inundation. **Effects on Terrestrial Environment (After Mitigation): Benefits.** The Mitigation strategy would provide for resource enhancement in accordance with CALFED Program guidance and in coordination with regional conservation. It includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres (CALFED, 2004).
	Mirant Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been established, so the actual biological effects cannot be determined. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Regional Desalination Project	TBD[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for each concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G19-4 - Environmental Score Card (Page 2 of 3)

Performance	Concept	Concept Rating
Wetlands		
Potential Impacts to Wetlands (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Wetlands (Before Mitigation): Impacts.** Total direct effects from inundation would be 1.3 acres. **Effects on Wetlands (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes wetlands.
	Mirant Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but not be limited to, restriction on the construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, such effects would likely be temporary in nature. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but are not be limited to, restriction on construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Regional Desalination Project	TBD[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Special-Status Species (Before Mitigation): Impacts.** Each habitat type identified under "terrestrial environment," above, is associated with special status species, including but not limited to: - San Joaquin kit fox, - California red-legged frog, - California tiger salamander, - Western pond turtle, - Bald eagle, - Curved-foot hygrotis diving beetle, - Mason's lilaeopsis, - Alkali milk-vetch, - Heartscale, - Brittlescale, - San Joaquin spearscale, - Recurved larkspur, - Contra Costa goldfields, - Vernal pool fairly shrimp, etc. **Effects on Special-Status Species (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes protection of habitat that support these species.
	Mirant Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to, preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Regional Desalination Project	TBD[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

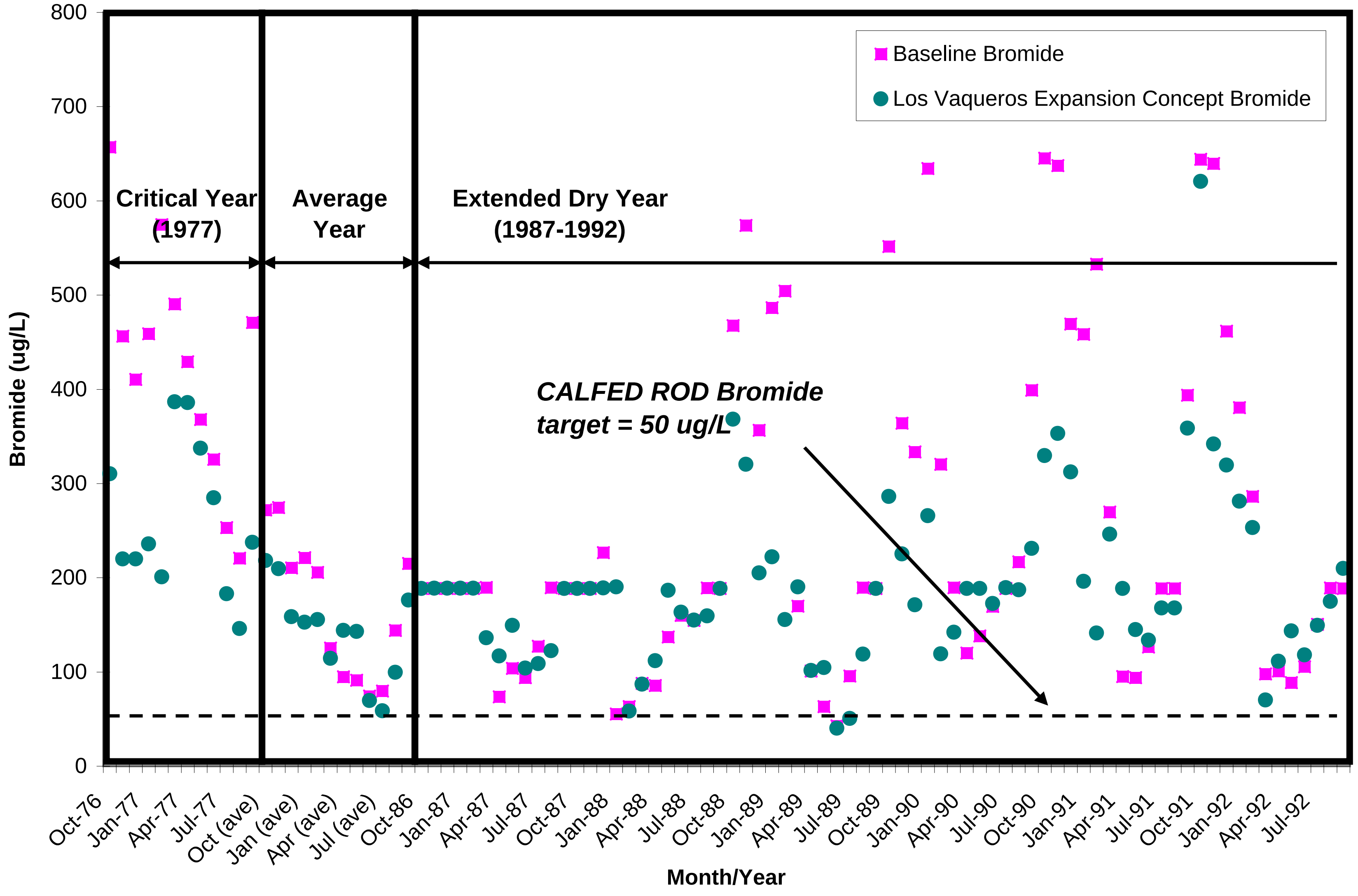
Table G19-4 - Environmental Score Card (Page 3 of 3)

Performance	Concept	Concept Rating
Energy Consumption		
Potential Increases in Energy Consumption (amount of energy required for facility operation) Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	Project	NA
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases. T**he proposed concept would consume 183 million kwh of energy. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants.
	Mirant Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.
	Near Bay Bridge Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.
	Regional Desalination Project	TBD[2] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.

1. To be determined in future studies.
2. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

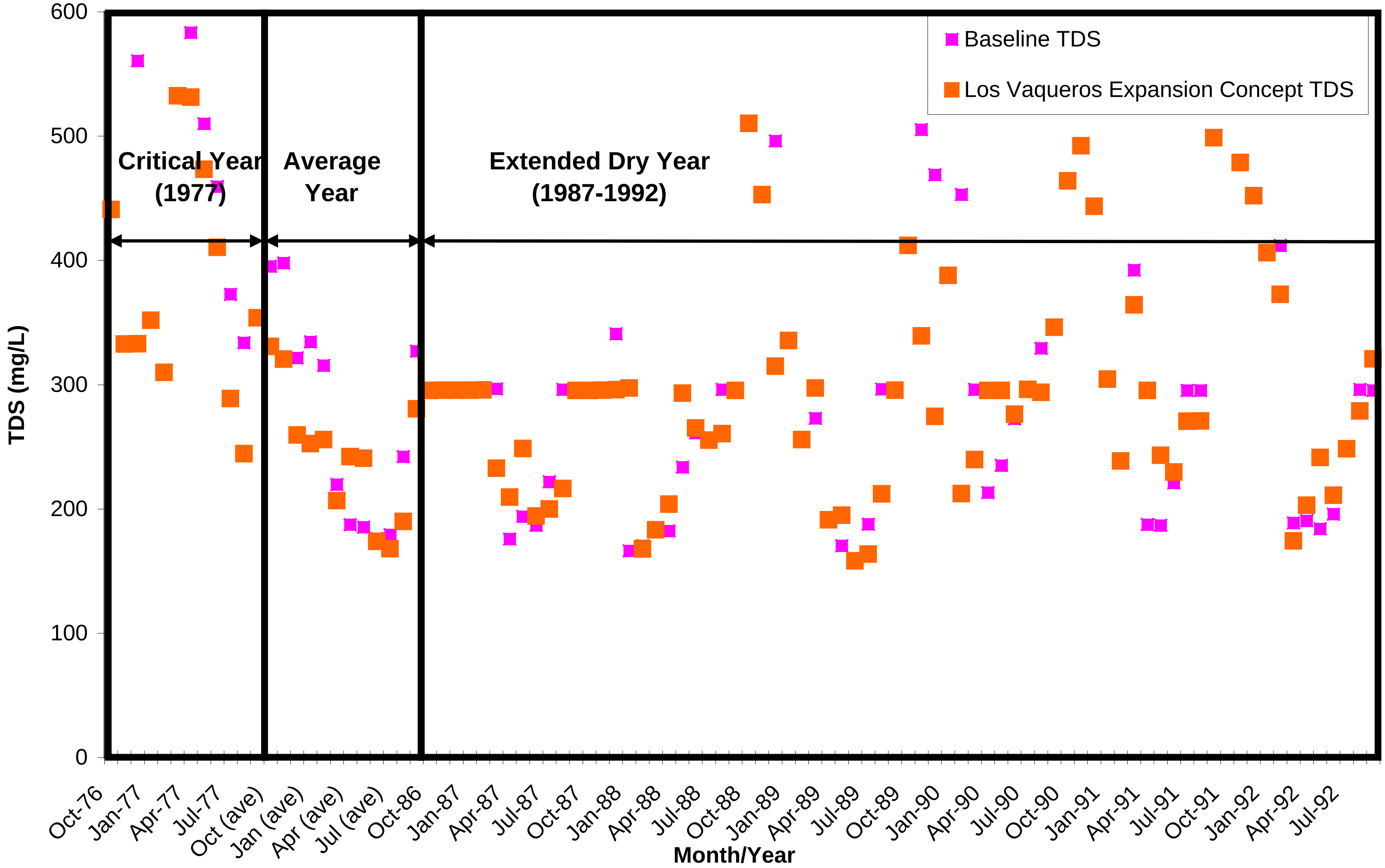
CCWD: Comparison of Concepts

Comparison of CCWD Baseline Source Water with Concept Bromide



CCWD: Comparison of Concepts

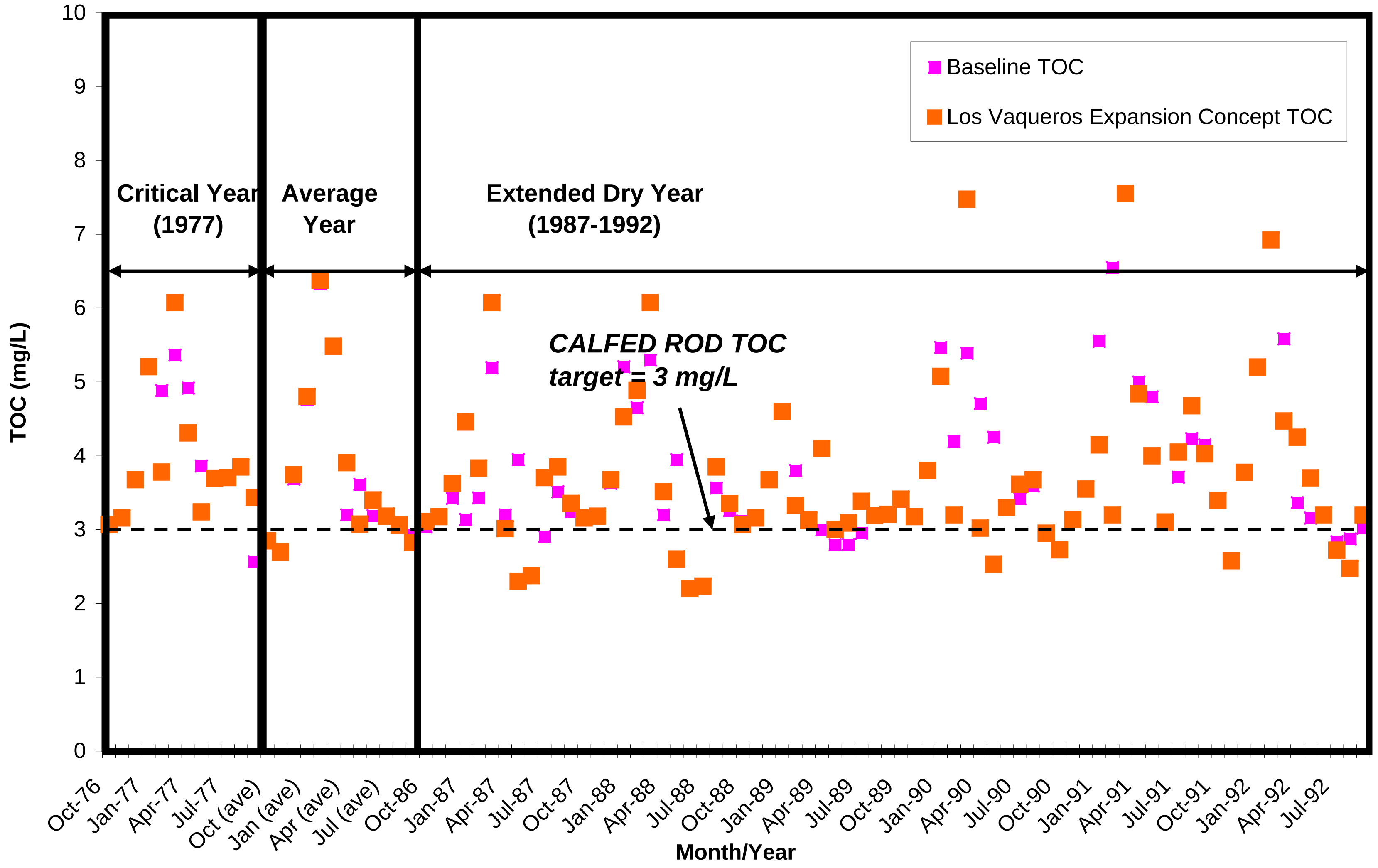
Comparison of CCWD Baseline Source Water TDS with Concept TDS



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

CCWD: Comparison of Concepts

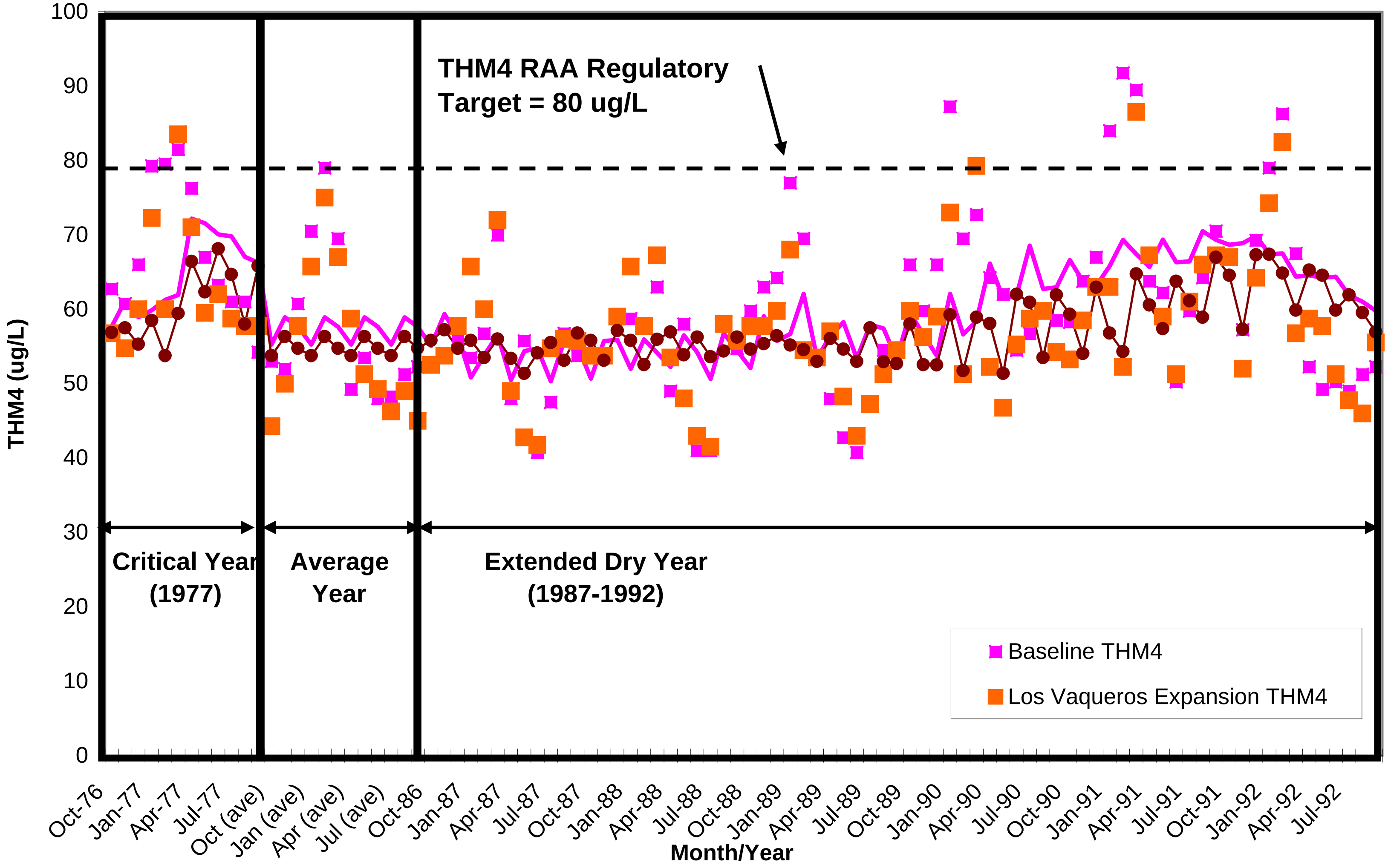
Comparison of CCWD Baseline Source Water TOC with Concept TOC



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

CCWD: Comparison of Concepts

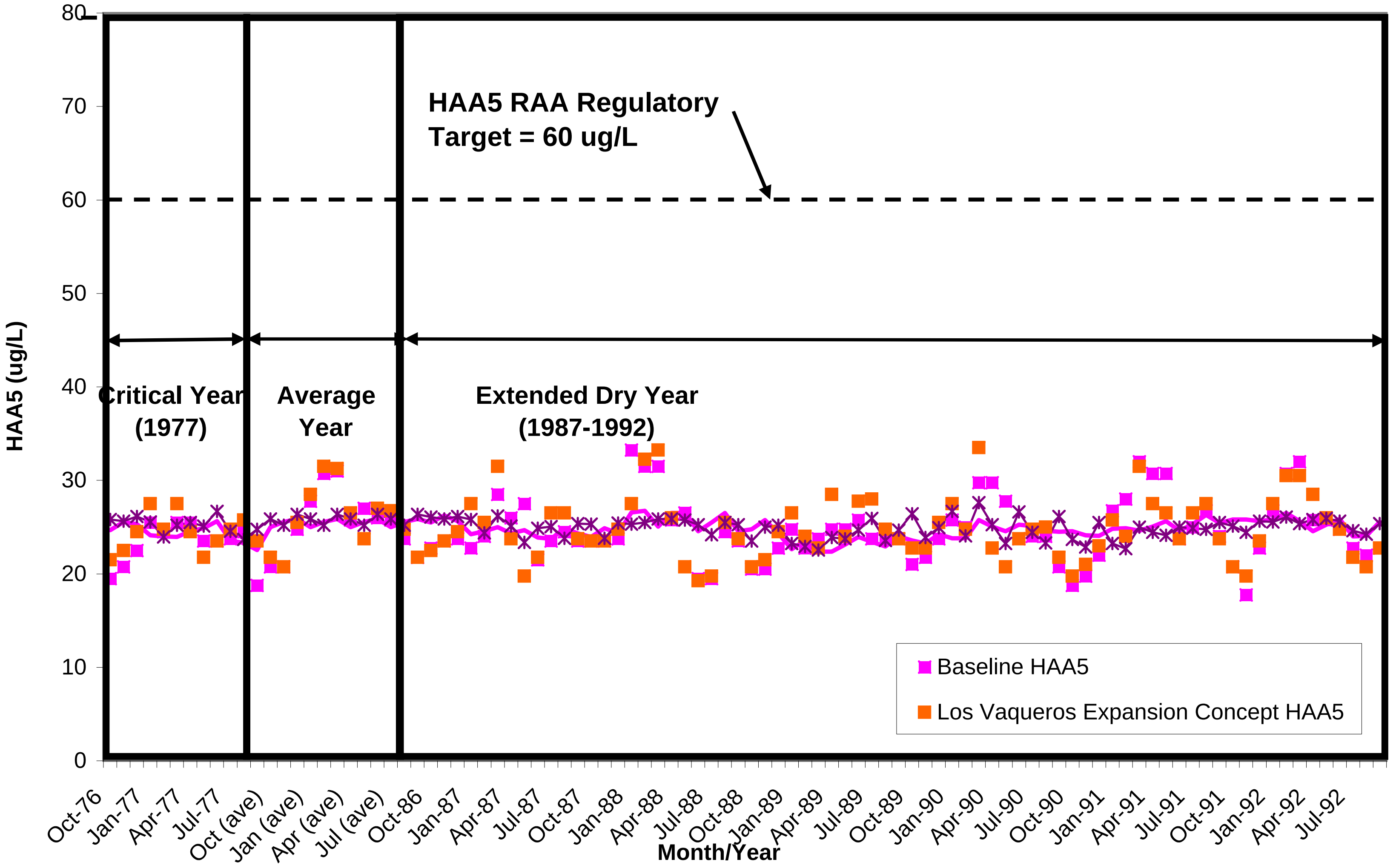
Comparison of CCWD Baseline Source Water THM4 with Concept THM4



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

CCWD: Comparison of Concepts

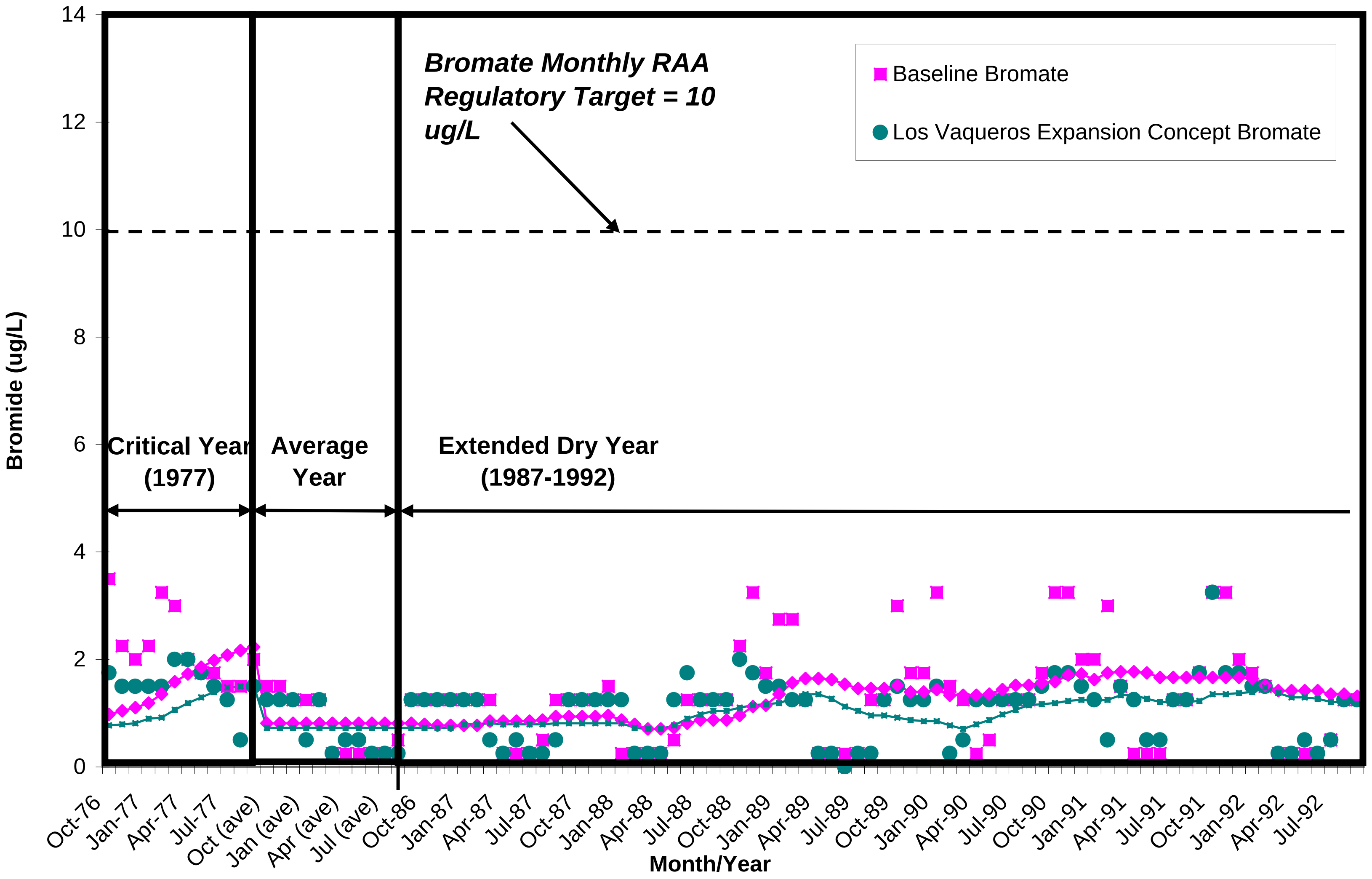
Comparison of CCWD Baseline HAA5 with Concept HAA5



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

CCWD: Comparison of Concepts

Comparison of CCWD Baseline Source Water with Concept Bromate



Note: ELV source water quality is the simulated mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming 75% Bollman and 25% Randall Bold blend.

G20 EBMUD Concepts

G20 East Bay Municipal Utility District : All Concepts

DESCRIPTION

East Bay Municipal Utility District (EBMUD) is a potential beneficiary for the following concepts:

- Regional Desalination Project
- Mirant Desalination with Water Quality
- Near Bay Bridge Desalination with Water Quality
- Bay Area Use of Freeport Regional Water Project
- Enhanced Conservation
- Recycled Water Concepts

The attached scorecard summarizes information for five of these six concepts. Enhanced conservation is not included on the scorecard because no specific conservation thresholds have been established.

Each of the concepts and the potential benefits are summarized below.

EBMUD Concepts Summary

Regional Desalination Project
Average Year Water Quality .... 0 AFY
Dry Year Supply Reliability .... TBD in future studies

Mirant Desalination with Water Quality
Average Year Water Quality .... 0 AFY
Dry Year Supply Reliability .... TBD in future studies

Near Bay Bridge with Water Quality
Average Year Water Quality .... 0 AFY
Dry Year Supply Reliability .... TBD in future studies

Bay Area Use of Freeport Regional Water Project
Average Year Water Quality .... 0 AFY
Dry Year Supply Reliability .... NA

Enhanced Conservation
Supply, All Years .... TBD in future studies

Recycled Water Concepts
Supply, All Years .... Up to 15,400 AFY

❑ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, which will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are Contra Costa Water District (CCWD), EBMUD, San Francisco Public Utilities Commission (SFPUC) and Santa Clara Valley Water District (SCVWD). The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

❑ *Mirant Desalination with Water Quality Element*

This concept involves co-location of a 40 MGD desalination plant at either the Mirant Pittsburg Power Plant, in Pittsburg, or the Mirant Contra Costa Power Plant in Antioch, and conveyance of up to 25 MGD of desalinated water in average years to Zone 7 Water Agency (Zone 7) for water quality blending. This concept could potentially be implemented if the Regional Desalination Project, which is evaluating desalination plants at a number of different locations, were to develop a desalination plant at one of the Mirant sites. A 40 MGD facility is assumed, based on preliminary sizing evaluated for the Mirant site. The Mirant Desalination with Water Quality Element concept has not been evaluated by the RDP partners.

Although the concept would also have dry-year supply reliability benefits, these will be determined by RDP studies and have not been quantified. This concept uses the same interconnection facilities and timing of deliveries for Zone 7 as the Near Bay Bridge Desalination with Water Quality Element and Bay Area Use of Freeport Regional Water Project, so only one of these concepts could be implemented.

❑ *Near Bay Bridge Desalination with Water Quality Element*

The Near Bay Bridge Desalination with Water Quality Element concept would involve location of a 40 MGD desalination plant near the EBMUD Regional Wastewater Treatment Plant (WWTP), located in Oakland at the eastern end of the Bay Bridge, and conveyance of up to 25 MGD of desalinated water in average years to Zone 7 for water quality blending.

This concept could potentially be implemented if the RDP, which is evaluating desalination plants at a number of different locations, were to develop a desalination plant at the Near Bay Bridge site.

Although the concept would also have dry-year supply reliability benefits, these will be determined by Regional Desalination Project studies and have not been quantified. This concept uses the same interconnection facilities and timing of deliveries for Zone 7 as the Mirant Desalination with Water Quality Element and Bay Area Use of Freeport Regional Water Project, so only one of these concepts could be implemented.

❑ *Bay Area Use of Freeport Regional Water Project*

EBMUD and Sacramento County Water Agency (SCWA) have formed a Joint Powers Authority called the Freeport Regional Water Authority (FRWA) to implement the Freeport Regional Water Project (FRWP). The project would provide up to 100 MGD of dry-year supply for EBMUD from a new diversion located on the Sacramento River near Freeport. New pipelines would convey water from the Sacramento River to the Folsom South Canal, and from the canal to the EBMUD Mokelumne Aqueducts. During winter months of average and wet years, up to 25 MGD could potentially be delivered through the Freeport facilities and EBMUD system to Zone 7 for water quality blending.

EBMUD would be a financial beneficiary for this concept. This concept uses the same interconnection facilities and timing of deliveries for Zone 7 as the Mirant Desalination with Water Quality Element and Near Bay Bridge Desalination with Water Quality Element, so only one of these concepts could be implemented.

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 acre-feet per year (AFY) of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the Bay Area Water Quality and Supply Reliability Program. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

EBMUD is a potential beneficiary for nine recycled water concepts with a total yield of 15,400 AFY

- Central Contra Costa Sanitary District (CCCSD) Recycled Water Irrigation Projects (3,000 AFY)
- Expanded DERWA Recycled Water Project (1,400 AFY)
- Expanded East Bayshore Recycled Water Project (2,000 AFY)
- Expanded San Ramon Valley Recycled Water Project (1,900 AFY)
- Franklin Canyon Recycled Water Project (300 AFY)
- Lamorinda Phase I Recycled Water Project (1,100 AFY)
- North Richmond Recycled Water Project (4,500 AFY)
- San Leandro Recycled Water Project (1,100 AFY)
- Satellite EBMUD Recycled Water Project (20 AFY)

Table G20-1 - Supply Reliability Score Card

Concept or Example Portfolio	Agency Baseline Amount or Description	Agency Baseline Units	Concept Amount or Description	Concept Units	Agency Baseline Plus Amount or Description	Agency Baseline Plus Units	Notes/Other
Meet Demand							
Critical Drought							
Bay Area Use of the Freeport Regional Water Project	200,430	AFY	0	AFY	200,430	AFY	For the Mirant Desalination Concept, EBMUD could receive dry-year supply via the Mokelumne Aqueduct. Specific plant locations, allocations or exchange between EBMUD and CCWD or with other partner agencies will be determined as part of the Regional Desalination Project. This concept, which is a variation on the RDP (and is not being evaluated in the RDP), evaluates only the Mirant site and includes potential average water quality deliveries to Zone 7, who is not a partner agency. Zone 7 would not be a recipient of dry-year supply. For the Near Bay Bridge Desalination Concept, EBMUD could receive dry-year supply for its West of Hills (WOH) System. In winter months of average and wet years, water could be conveyed to Zone 7 via the WOH system, and Southern Loop, and East of Hills (EOH) System, to a new interconnection sized to deliver up to 20 MGD to the Zone 7 system, when excess capacity is available in the EBMUD distribution system. Specific plant locations, allocations or exchange with other partner agencies will be determined as part of the RDP. This concept, which is a variation on the RDP (and is not being evaluated in the RDP), evaluates only the Near Bay Bridge site and includes potential average water quality deliveries to Zone 7, who is not an RDP partner agency.
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion	N/A	AFY	N/A	AFY	N/A	AFY	
Mirant Desalination with Water Quality Element[1,2]	200,430	AFY	Up to 43,000	AFY	Up to 243,430	AFY	
Near Bay Bridge Desalination with Water Quality Element[1,2]	200,430	AFY	Up to 43,000	AFY	Up to 243,430	AFY	
Regional Desalination Project[2]	200,430	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	200,430	AFY	15,366	AFY	200,430	AFY	
Extended Drought							
Bay Area Use of the Freeport Regional Water Project	216,420	AFY	0	AFY	216,420	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion	N/A	AFY	N/A	AFY	N/A	AFY	
Mirant Desalination with Water Quality Element[1,2]	216,420	AFY	Up to 43,000	AFY	Up to 255,590	AFY	
Near Bay Bridge Desalination with Water Quality Element[1,2]	216,420	AFY	Up to 43,000	AFY	Up to 255,590	AFY	
Regional Desalination Project[2]	216,420	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	216,420	AFY	15,366	AFY	216,420	AFY	
Average Year							
Bay Area Use of the Freeport Regional Water Project	255,590	AFY	0	AFY	255,590	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion	N/A	AFY	N/A	AFY	N/A	AFY	
Mirant Desalination with Water Quality Element[1,2]	255,590	AFY	0	AFY	255,590	AFY	
Near Bay Bridge Desalination with Water Quality Element[1,2]	255,590	AFY	0	AFY	255,590	AFY	
Regional Desalination Project[2]	255,590	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	255,590	AFY	15,366	AFY	255,590	AFY	
Vulnerability							
Bay Area Use of the Freeport Regional Water Project	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. East of Hills service area vulnerable to loss of Mokelumne Aqueducts, since local supply can only be served to a small area.		No Effect on Vulnerability - Wheeling water through the EBMUD system will have no effect on EBMUD vulnerability.				
Calaveras Reservoir Expansion - Water Supply			N/A				
Calaveras Reservoir Expansion - Water Quality			N/A				
East Bay Saline Groundwater Desalination			N/A				
Los Vaqueros Reservoir Expansion			N/A				
Mirant Desalination with Water Quality Element			TBD[2]				
Near Bay Bridge Desalination with Water Quality Element			TBD[2]				
Regional Desalination Project			TBD[2]				
South Bay Desalination - Irrigation Use			N/A				
South Bay Desalination - Potable Use			N/A				
Water Recycling			No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems of potential participating agencies.				
Self-Sufficiency within the Region							
Bay Area Use of the Freeport Regional Water Project	No Effect on Self-Sufficiency within the Region - Agreements required with EBMUD, who would control project operation. Project implementation would not only require agreements between Zone 7 and EBMUD, but could involve the State of California (changes t						
Calaveras Reservoir Expansion - Water Supply	N/A						
Calaveras Reservoir Expansion - Water Quality	N/A						
East Bay Saline Groundwater Desalination	N/A						
Los Vaqueros Reservoir Expansion	N/A						
Mirant Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would contro						
Near Bay Bridge Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would cont						
Regional Desalination Project	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled.						
South Bay Desalination - Irrigation Use	N/A						
South Bay Desalination - Potable Use	N/A						
Water Recycling	Increases Self-Sufficiency within Region. Concepts will be owned, operated, and controlled locally.						

1. Shaded cells reflect potential benefits associated with the base desalination facility, to be determined by the Regional Desalination Project. Unshaded cells reflect incremental benefits associated with the concept (water quality element).

2. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP. EBMUD would take up to 43,000 MGD of dry year supply as necessary to meet demand, and would not take supply in excess of demand.

Table G20-2 - Public Health Protection Scorecard (Page 1 of 2)

	Concept[1]		Agency Baseline Plus Concept[2]		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus EBMUD Source Water**	**Concept Plus EBMUD Treated Water**	**Notes**
Variability for Treatment					
Bay Area Use of the Freeport Regional Water Project	Increases Variability	NA	NA	NA	Bromide slightly less variable, TOC and TDS more variable. No projected treatment implications.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	No Effect on Variability	NA	Bromide slightly more variable, TOC and TDS same to less variable. No projected treatment implications.
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	No impact on source water quality.
Regional Desalination Project	TBD[3] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Total Dissolved Solids					
Bay Area Use of the Freeport Regional Water Project	NA	NA	Increases TDS	Increases TDS	TDS increased slightly in average years. Well below secondary standard.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	No Effect on TDS	No Effect on TDS	
Near Bay Bridge Desalination with Water Quality Element	NA	Increases TDS	NA	NA	TDS target slightly higher than EBMUD TDS.
Regional Desalination Project	TBD[3] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Disinfection By-Products					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	Increases DBPs	Bromate reduced, THM4s & HAA5 increased.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	No Effect on DBPs	Bromate and THM4 increased slightly, HAA5 slightly reduced.
Near Bay Bridge Desalination with Water Quality Element	NA	Reduces DBPs	NA	NA	All DBPs reduced for EBMUD customers receiving Near Bay Bridge water. However, due to elevated bromide levels, a higher fraction of brominated DBPs are expected.
Regional Desalination Project	TBD[3] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		

1. Values in these columns represent the quality of the Near Bay Bridge Desalination with Water Quality Element concept supply only, and do not reflect the effects of blending with EBMUD supplies.
2. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively). For the purposes of this study, Mirant Desalination permeate TDS was approximated as average Freeport TDS. Actual permeate water quality will be determined by the RDP.
3. Location of facilities and specific benefits to agencies will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G20-2 - Public Health Protection Scorecard (Page 2 of 2)

	Concept[1]		**Agency Baseline Plus Concept[2]**		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus EBMUD Source Water**	**Concept Plus EBMUD Treated Water**	**Notes**
Taste and Odor Problems (Excluding TDS)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	Degrades T&O	Reduced overall quality
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	NA	Degrades T&O	Reduced overall quality. Bromide increased to concentrations experienced in dry years.
Near Bay Bridge Desalination with Water Quality Element	NA	Degrades T&O	NA	NA	Reduced overall quality. Bromide and TDS increased.
Regional Desalination Project	TBD[3] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	Incremental impacts associated with operating the Freeport conveyance facilities in average years are projected to be minimal.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	Increases Potential for Degradation	NA	Mirant water quality is slightly degraded as compared with EBMUD baseline, but represents an improvement over the Zone 7 baseline.
Near Bay Bridge Desalination with Water Quality Element	NA	Increases Potential for Degradation	NA	NA	
Regional Desalination Project	TBD[3] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	Incremental impacts associated with operating the Freeport conveyance facilities in average years are projected to be minimal.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality[1]	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	NA	
Mirant Desalination with Water Quality Element	NA	NA	No Effect on Potential for Degradation	NA	Emerging contaminants are not expected to be a factor with desalinated brackish supplies.
Near Bay Bridge Desalination with Water Quality Element	NA	Increases Potential for Degradation	NA	NA	
Regional Desalination Project	TBD[3] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	Increases Potential for Degradation	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with adva		

1. Values in these columns represent the quality of the Near Bay Bridge Desalination with Water Quality Element concept supply only, and do not reflect the effects of blending with EBMUD supplies.
2. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively). For the purposes of this study, Mirant Desalination permeate TDS was approximated as average Freeport TDS. Actual permeate water quality will be determined by the RDP.
3. Location of facilities and specific benefits to agencies will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G20-2a - Public Health Protection Score Card by Agency[1]

Concept: Mirant Desalination with Water Quality Element

			Agency Baseline[2]		Concept		Baseline Plus Concept[3]		
Performance Measure/Objective	**Metric or Qual**	**Units**	**EBMUD Source Water**	**EBMUD Treated Water[4]**	**Mirant Desalination with Water Quality Element Source Water**	**Mirant Desalination with Water Quality Element Treated Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Source Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Treated Water[4]**	**Notes**
Supply Quantity									
Critical Year		AFY	200,430		0		200,430		
Extended Dry Year		AFY	216,420		0		216,420		
Average Year		AFY	255,590		0		255,590		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.05	0.01 - 0.04	NA	NA	NA	NA	
	Mean	mg/L	0.03	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.8 - 3.3	1.1 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	2.7	1.9	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	ND - 0.05	ND - 0.05	NA	NA	NA	NA	
	Mean	mg/L	0.02	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.0 - 3.3	0.5 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	1.8	1.1	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.01	0.01 - 0.01	NA	NA	0.01 - 0.01	0.01 - 0.01	
	Mean	mg/L	0.01	0.01	NA	NA	0.01	0.01	
TOC	Range	mg/L	0.6 - 1.3	0.1 - 0.7	NA	NA	0.6 - 1.3	0.1 - 0.7	
	Mean	mg/L	1.0	0.4	NA	NA	0.9	0.4	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	variable	variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	36 - 113	56 - 133	NA	NA	NA	NA	
	Mean	mg/L	80	100	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	28 - 108	48 - 128	NA	NA	NA	NA	
	Mean	mg/L	55	75	NA	NA	NA	NA	
Average Year	Range	mg/L	31 - 37	51 - 57	NA	NA	32 - 39	51 - 59	
	Mean	mg/L	35	54	NA	NA	36	55	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	1	NA	NA	NA	NA	
THM4	Range	ug/L	NA	10 - 16	NA	NA	NA	NA	
	Mean	ug/L	NA	14	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	8 - 12	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	2 - 14	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	5 - 13	NA	NA	NA	NA	
	Mean	ug/L	NA	9	NA	NA	NA	NA	
Average Year									
Bromate	Range	ug/L	NA	ND	NA	NA	NA	ND	
	Mean	ug/L	NA	ND	NA	NA	NA	ND	
THM4	Range	ug/L	NA	3 - 7	NA	NA	NA	3 - 7	
	Mean	ug/L	NA	5	NA	NA	NA	5	
HAA5	Range	ug/L	NA	4 - 8	NA	NA	NA	4 - 8	
	Mean	ug/L	NA	6	NA	NA	NA	6	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	diminished	Lower quality source (higher bromide)
Algal blooms	Qual		minimal	NA	NA	NA	improved	NA	TOC is decreased, temperature is not greatly affected

1. Scores reflect water quality effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. Baseline water quality data was collected from EBMUD and is detailed in the EBMUD section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively) . For the purposes of this study, Mirant Desalination permeate TDS was approximated as average Freeport TDS. Actual permeate water quality will be determined by the RDP.

4. For the purposes of this analysis, settled water ozonation was assumed.

Table G20-2b - Public Health Protection Score Card by Agency [1]

Concept: Near Bay Bridge Desalination with Water Quality Element

			Agency Baseline[2]		Concept[3]		Baseline Plus Concept		
Performance Measure/Objective	Metric or Qual	Units	EBMUD Source Water	EBMUD Treated Water[4]	Near Bay Bridge Desalination with Water Quality Element Source Water	Near Bay Bridge Desalination with Water Quality Element Treated Water	Agency Baseline Near Bay Bridge Desalination with Water Quality Element Source Water	Agency Baseline Near Bay Bridge Desalination with Water Quality Element Treated Water[4]	Notes
Supply Quantity									
Critical Year		AFY	200,430		Up to 43,000		Up to 243,430		
Extended Dry Year		AFY	216,420		Up to 43,000		Up to 259,420		
Average Year		AFY	255,590		0		255,590		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.05	0.01 - 0.04	NA	NA	NA	NA	
	Mean	mg/L	0.03	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.8 - 3.3	1.1 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	2.7	1.9	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	ND - 0.05	0.00 - 0.05	NA	NA	NA	NA	
	Mean	mg/L	0.02	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.0 - 3.3	0.5 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	1.8	1.1	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.01	0.01 - 0.01	NA	0.11 - 0.11	NA	NA	Elevated bromide levels are expected.
	Mean	mg/L	0.01	0.01	NA	0.11	NA	NA	
TOC	Range	mg/L	0.6 - 1.3	0.1 - 0.7	NA	0.1 - 0.1	NA	NA	
	Mean	mg/L	1.0	0.4	NA	0.1	NA	NA	
pH	Qual		somewhat variable	constant	NA	somewhat variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	36 - 113	56 - 133	NA	NA	NA	NA	
	Mean	mg/L	80	100	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	28 - 108	48 - 128	NA	NA	NA	NA	
	Mean	mg/L	55	75	NA	NA	NA	NA	
Average Year	Range	mg/L	31 - 37	51 - 57	NA	150 - 150	NA	NA	
	Mean	mg/L	35	54	NA	150	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	1	NA	NA	NA	NA	
THM4	Range	ug/L	NA	10 - 16	NA	NA	NA	NA	
	Mean	ug/L	NA	14	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	8 - 12	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	2 - 14	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	5 - 13	NA	NA	NA	NA	
	Mean	ug/L	NA	9	NA	NA	NA	NA	
Average Year									
Bromate	Range	ug/L	NA	ND	NA	ND - ND	NA	NA	
	Mean	ug/L	NA	ND	NA	ND	NA	NA	
THM4	Range	ug/L	NA	3 - 7	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	5	NA	1	NA	NA	
HAA5	Range	ug/L	NA	4 - 8	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	6	NA	1	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	No agencies receive source water from this concept.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. Scores reflect water quality effects resulting from conveyance of Near Bay Bridge Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.
2. Baseline water quality data was collected from EBMUD and is detailed in the EBMUD section of the Water Supply and Water Quality Baseline Technical Memorandum.
3. Values in these columns represent the quality of the Near Bay Bridge finished water only, and do not reflect the effects of blending with EBMUD supplies. For the purposes of this study, Near Bay Bridge Desalination permeate TDS was approximated at 150 mg/L.
4. For the purposes of this analysis, settled water ozonation was assumed.

Table G20-2c - Public Health Protection Score Card by Agency[1]

Concept: Bay Area Use of the Freeport Regional Water Project

			Agency Baseline[2]		Concept		Baseline Plus Concept[3]		
Performance Measure/Objective	**Metric or Qual**	**Units**	**EBMUD Source Water**	**EBMUD Treated Water**	**Bay Area Use of Freeport Regional Project Source Water**	**Bay Area Use of Freeport Regional Project Treated Water**	**Agency Baseline Plus Bay Area Use of Freeport Regional Project Source Water**	**Agency Baseline Plus Bay Area Use of Freeport Regional Project Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	200,430		0		200,430		
Extended Dry Year		AFY	216,420		0		216,420		
Average Year		AFY	255,590		0		255,590		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.05	0.01 - 0.04	NA	NA	NA	NA	
	Mean	mg/L	0.03	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.8 - 3.3	1.1 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	2.7	1.9	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	ND - 0.05	0.00 - 0.05	NA	NA	NA	NA	
	Mean	mg/L	0.02	0.02	NA	NA	NA	NA	
TOC	Range	mg/L	1.0 - 3.3	0.5 - 2.4	NA	NA	NA	NA	
	Mean	mg/L	1.8	1.1	NA	NA	NA	NA	
pH	Qual		somewhat variable	constant	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.01	0.01 - 0.01	NA	NA	0.01 - 0.01	0.01 - 0.01	
	Mean	mg/L	0.01	0.01	NA	NA	0.01	0.01	
TOC	Range	mg/L	0.6 - 1.3	0.1 - 0.7	NA	NA	0.6 - 1.3	0.1 - 0.7	
	Mean	mg/L	1.0	0.4	NA	NA	1.0	0.5	
pH	Qual		somewhat variable	constant	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	variable	NA	NA	variable	variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	36 - 113	56 - 133	NA	NA	NA	NA	
	Mean	mg/L	80	100	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	28 - 108	48 - 128	NA	NA	NA	NA	
	Mean	mg/L	55	75	NA	NA	NA	NA	
Average Year	Range	mg/L	31 - 37	51 - 57	NA	NA	32 - 44	51 - 63	
	Mean	mg/L	35	54	NA	NA	39	59	
Disinfection Byproducts									
Critical Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	1	NA	NA	NA	NA	
THM4	Range	ug/L	NA	10 - 16	NA	NA	NA	NA	
	Mean	ug/L	NA	14	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	8 - 12	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
Extended Dry Year									
Bromate	Range	ug/L	NA	ND - 1	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	2 - 14	NA	NA	NA	NA	
	Mean	ug/L	NA	10	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	5 - 13	NA	NA	NA	NA	
	Mean	ug/L	NA	9	NA	NA	NA	NA	
Average Year									
Bromate	Range	ug/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	ug/L	NA	ND	NA	NA	NA	ND	
THM4	Range	ug/L	NA	3 - 7	NA	NA	NA	3 - 7	
	Mean	ug/L	NA	5	NA	NA	NA	6	
HAA5	Range	ug/L	NA	4 - 8	NA	NA	NA	4 - 8	
	Mean	ug/L	NA	6	NA	NA	NA	7	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	diminished	Lower quality source (higher TDS, TOC)
Algal blooms	Qual		minimal	NA	NA	NA	no change	NA	TOC is not substantially increased, temperature is not greatly affected

1. EBMUD is currently exploring a variety of options for conveying Freeport water to EBMUD customers. For the purposes of this analysis, it was assumed that water will be conveyed to the EBMUD distribution system via the Mokelumne Aqueduct. EBMUD water quality presented in the Baseline Plus Concept columns reflect blending of projected Freeport deliveries with projected Mokelumne deliveries. In actuality, water quality impacts of this concept may be isolated to the San Ramon Valley system.

2. Baseline water quality data was collected from EBMUD and is detailed in the EBMUD section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively) .

Table G20-3 - Cost, Environmental and Implementation Score Card (Page 1 of 5)

Performance Measure/Objective	Concept	Concept	Amount or Rating	Notes/Other
Cost Impacts				
Cost Impacts	Bay Area Use of the Freeport Regional Water Project	Capital Cost	TBD[1]	Operating costs for use of Freeport facilities and wheeling through EBMUD system would need to be determined by EBMUD. Conceptual-level intertie costs are estimated to be $24M ($2005). Operational costs have not been estimated. Zone 7 life-cycle costs
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Supply	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Quality	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	East Bay Saline Groundwater Desalination	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Los Vaqueros Reservoir Expansion	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Mirant Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Near Bay Bridge Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	NA	
	Regional Desalination Project	Capital Cost	TBD[1]	Specific capital costs, operating costs and lifecycle costs will depend on location and operation of facilities. The Regional Desalination Project Phase 1 report included capital costs ($2003) ranging from $168M to $285M for a 40-MGD plant at each of the
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	South Bay Desalination - Irrigation Use	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	South Bay Desalination - Potable Use	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Water Recycling	Capital Cost	Up to $183 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
		Operating & Maintenance Cost	Up to $4.6 M/Yr	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	Up to $18 M/Yr	
		Allocation of Costs	Up to $1,559/AF	

1. To be determined in future studies.

Table G20-3 - Cost, Environmental and Implementation Score Card (Page 2 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Impacts to Environment	Bay Area Use of the Freeport Regional Water Project	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the regulating station and intertie would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby) etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
	Calaveras Reservoir Expansion - Water Supply		
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination		
	Los Vaqueros Reservoir Expansion		
	Mirant Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Regional Desalination Project	**TBD**[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use		
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G20-3 - Cost, Environmental and Implementation Score Card (Page 3 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Benefits to Environment	Bay Area Use of the Freeport Regional Water Project	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Storage of water from the Sacramento River in the Zone 7 aquifer could reduce groundwater salinity. Because Zone 7 utilizes some groundwater for drinking purposes, reduction of salinity would improve the groundwater quality, wastewater quality and increase water recycling opportunities. In addition, the provision of water directly to Zone 7 retailers could reduce a like amount of pumping from either the SWP or the groundwater basin. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Supply		
	Quality		
	East Bay Saline Groundwater Desalination		
	Los Vaqueros Reservoir Expansion		
	Mirant Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Regional Desalination Project	**TBD**[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use		
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Table G20-3 - Cost, Environmental and Implementation Score Card (Page 4 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Implementation Potential			
External Support	Bay Area Use of the Freeport Regional Water Project	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
	Calaveras Reservoir Expansion - Water Supply		
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination		
	Los Vaqueros Reservoir Expansion		
	Mirant Desalination with Water Quality Element	TBD[1]	
	Near Bay Bridge Desalination with Water Quality Element	TBD[1]	
	Regional Desalination Project	TBD[2] - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use		
	South Bay Desalination - Potable Use		
	Water Recycling	TBD[1] - Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.	
Ability to Get Outside Funding	Bay Area Use of the Freeport Regional Water Project	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
	Calaveras Reservoir Expansion - Water Supply		
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination		
	Los Vaqueros Reservoir Expansion		
	Mirant Desalination with Water Quality Element	TBD[1]	
	Near Bay Bridge Desalination with Water Quality Element	TBD[1]	
	Regional Desalination Project	TBD[2] - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use		
	South Bay Desalination - Potable Use		
	Water Recycling	TBD[1] - The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds.	
Consistency with Local and Regional Plans	All concepts	NA - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans	

1. To be determined in future studies.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G20-3 - Cost, Environmental and Implementation Score Card (Page 5 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Regional Perspective			
Number of Agencies Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	1	Zone 7
	Calaveras Reservoir Expansion - Water Supply	NA	
	Calaveras Reservoir Expansion - Water Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Near Bay Bridge Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Regional Desalination Project	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	6,000,000 people	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	280,000 people	
	Calaveras Reservoir Expansion - Water Supply	NA	
	Calaveras Reservoir Expansion - Water Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	280,000 people	
	Element	280,000 people	
	Regional Desalination Project	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	6,000,000 people	

1. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G20-4 - Environmental Score Card (Page 1 of 3)

Performance	Concept	Concept Rating
Aquatic Environment		
Potential Impacts to Aquatic Environment	Bay Area Use of the Freeport Regional Water Project	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Diversion of water during wet and average years of winter months (under high flow conditions) would not likely have adverse effects on Delta fisheries as less than one percent of flow would be diverted in any winter months, and the existing intake is equipped with a fish exclusion system. Additional studies would be required to confirm this assessment. Construction of concept facilities (regulating station and pipeline) would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	NA
	Mirant Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 15,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 10,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)	Bay Area Use of the Freeport Regional Water Project	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the pipelines and regulating station have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	NA
	Mirant Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been established, so the actual biological effects cannot be determined. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for each concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G20-4 - Environmental Score Card (Page 2 of 3)

Performance	Concept	Concept Rating
Wetlands		
Potential Impacts to Wetlands (acreage affected)	Bay Area Use of the Freeport Regional Water Project	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	NA
	Mirant Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but not be limited to, restriction on the construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, such effects would likely be temporary in nature. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but are not be limited to, restriction on construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)	Bay Area Use of the Freeport Regional Water Project	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	NA
	Mirant Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to, preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

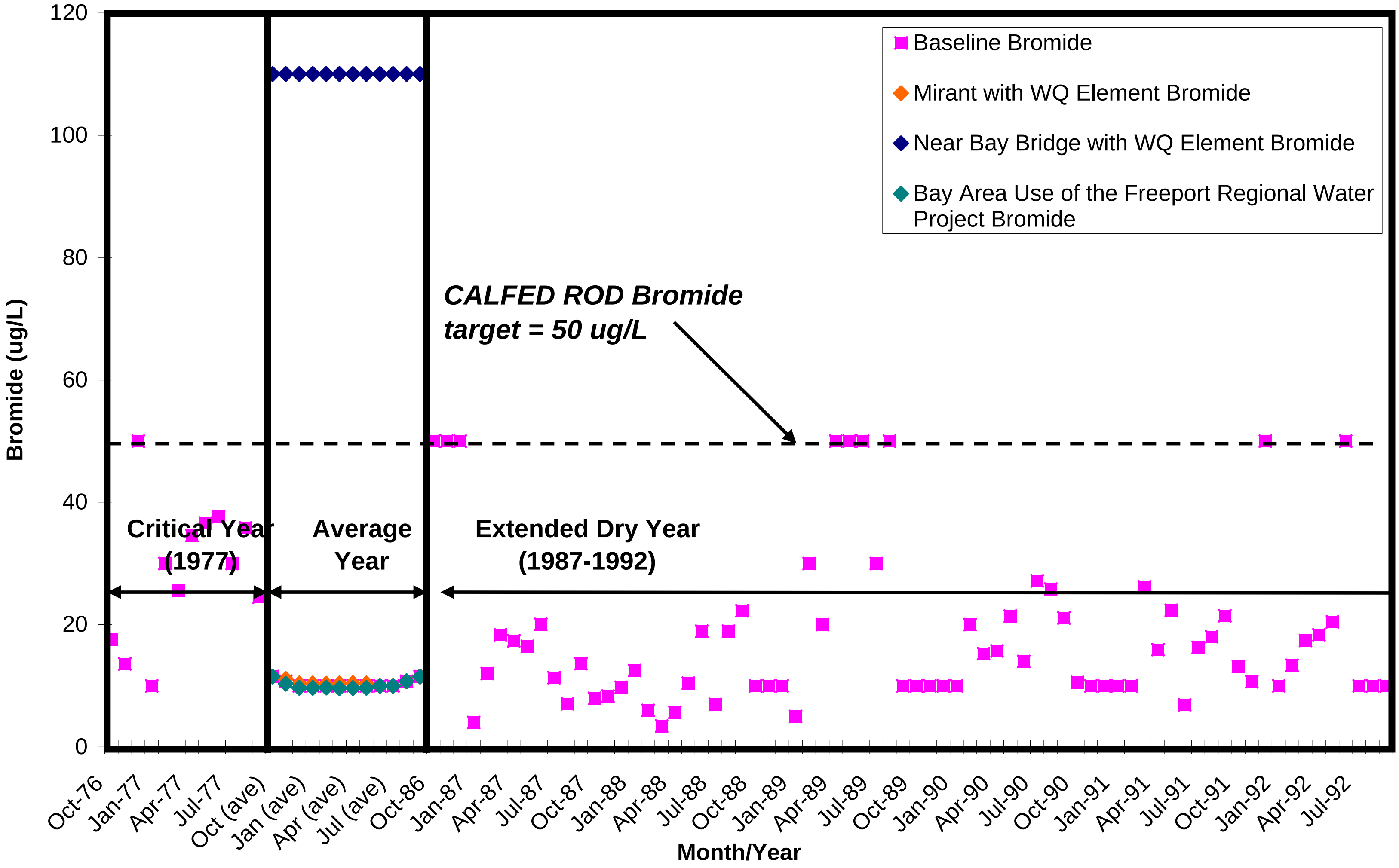
Table G21-4 - Environmental Score Card (Page 3 of 3)

Performance	Concept	Concept Rating	Notes
Energy Consumption			
Potential Increases in Energy Consumption (amount of energy required for facility operation) Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	Bay Area Use of the Freeport Regional Water Project	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Actual energy consumption not known. Operation of the existing facilities during the average to wet years would offset some amount of pumping of SBA facilities. The energy demand of concept facilities is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.	
	Supply		
	Calaveras Reservoir Expansion - Water Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	NA	
	Mirant Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.	
	Near Bay Bridge Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.	
	Regional Desalination Project	**TBD[2]** - Will depend on specific sites, sizes and operations.	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.	

1. To be determined in future studies.
2. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

EBMUD: Comparison of Concepts

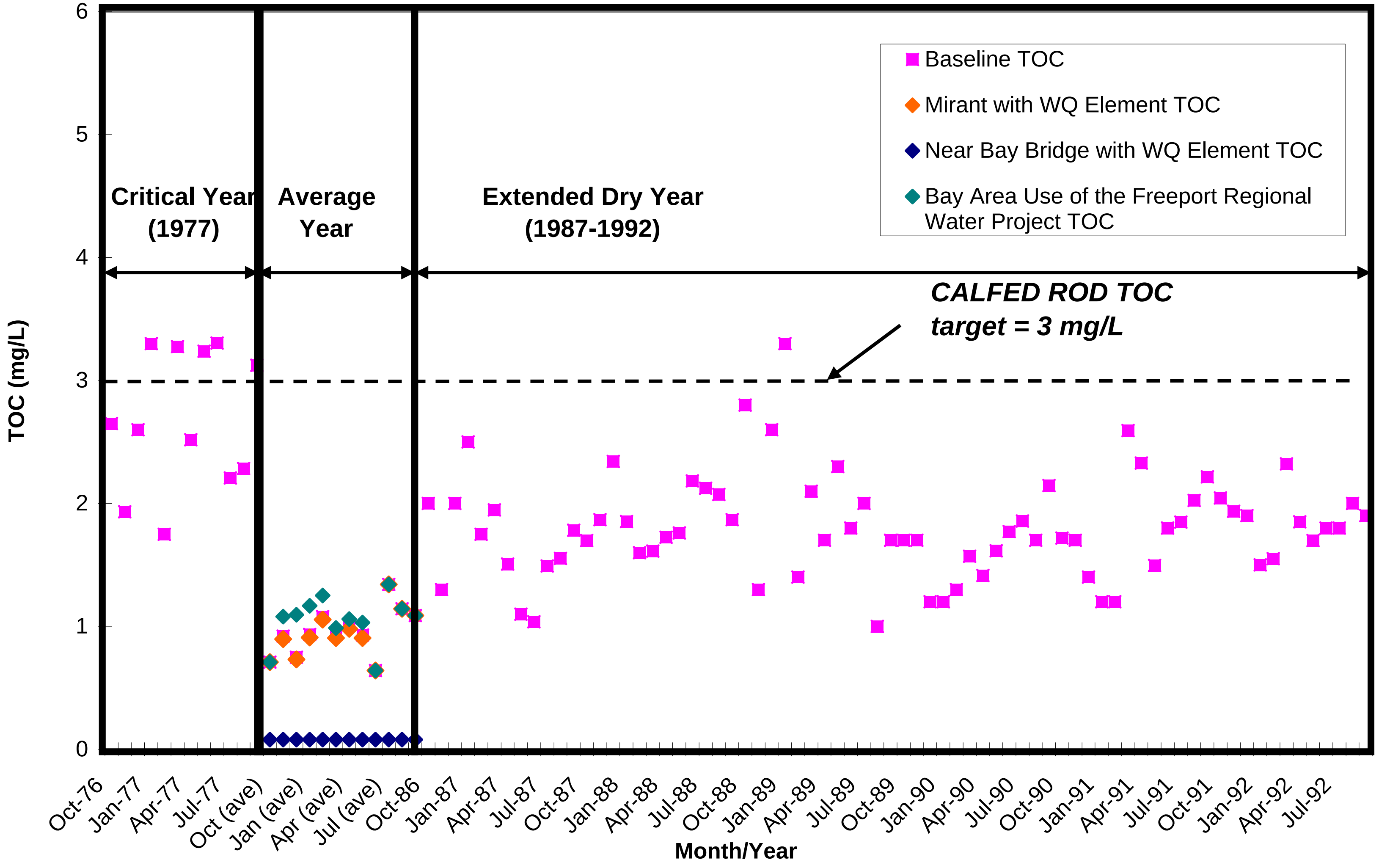
Comparison of EBMUD Baseline Source Water with Concept Bromide



Note: Mirant with Water Quality Element and Freeport bromide represent bromide in treated Mokelumne blend. Near Bay Bridge with Water Quality Element bromide represents bromide in pure desalinated supply and does not include blending with EBMUD supplies.

EBMUD: Comparison of Concepts

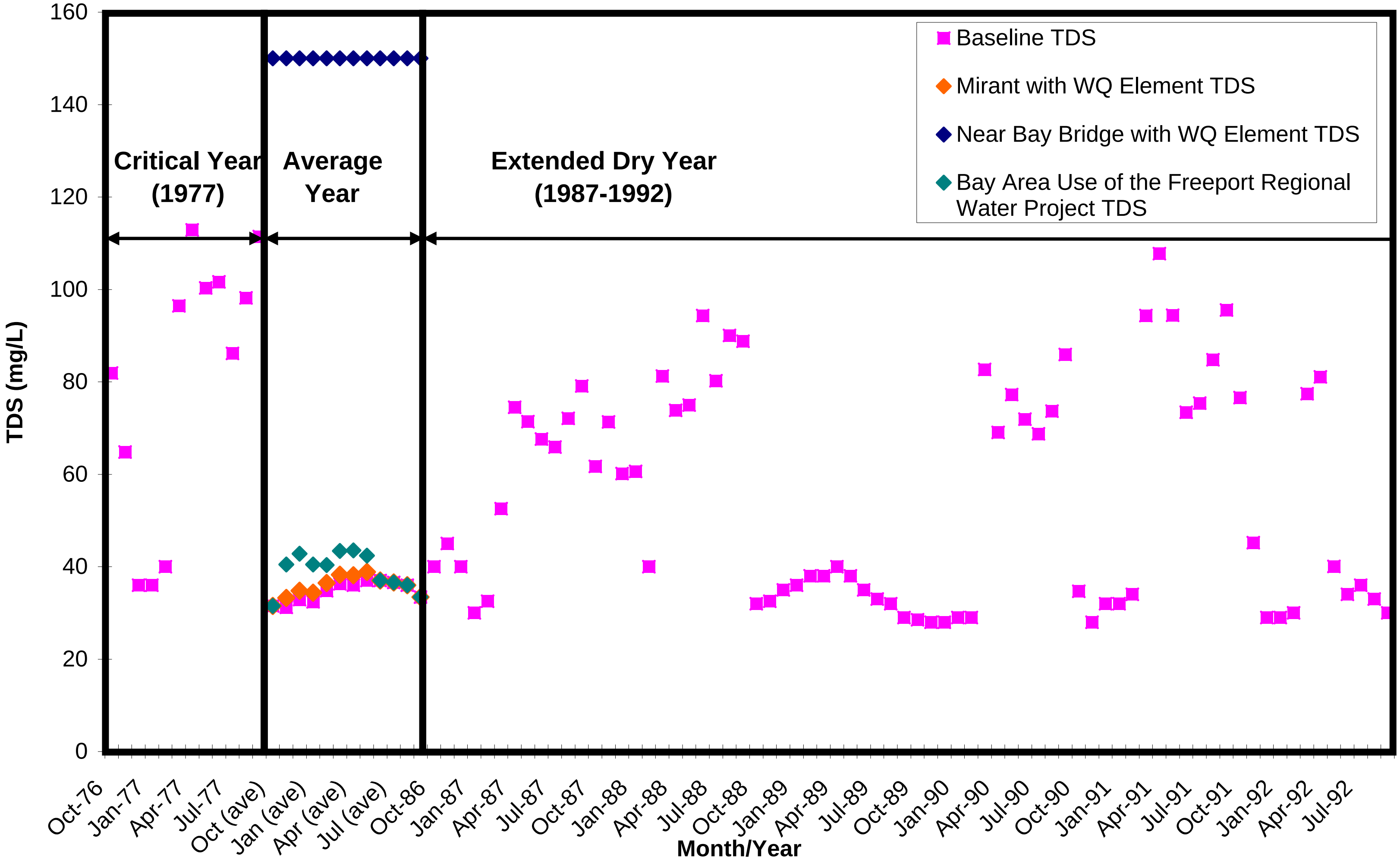
Comparison of EBMUD Baseline Source Water TOC with Concept TOC



Note: Mirant with Water Quality Element and Freeport TOC represent TOC in treated Mokelumne blend. Near Bay Bridge with Water Quality Element TOC represents TOC in pure desalinated supply and does not include blending with EBMUD supplies.

EBMUD: Comparison of Concepts

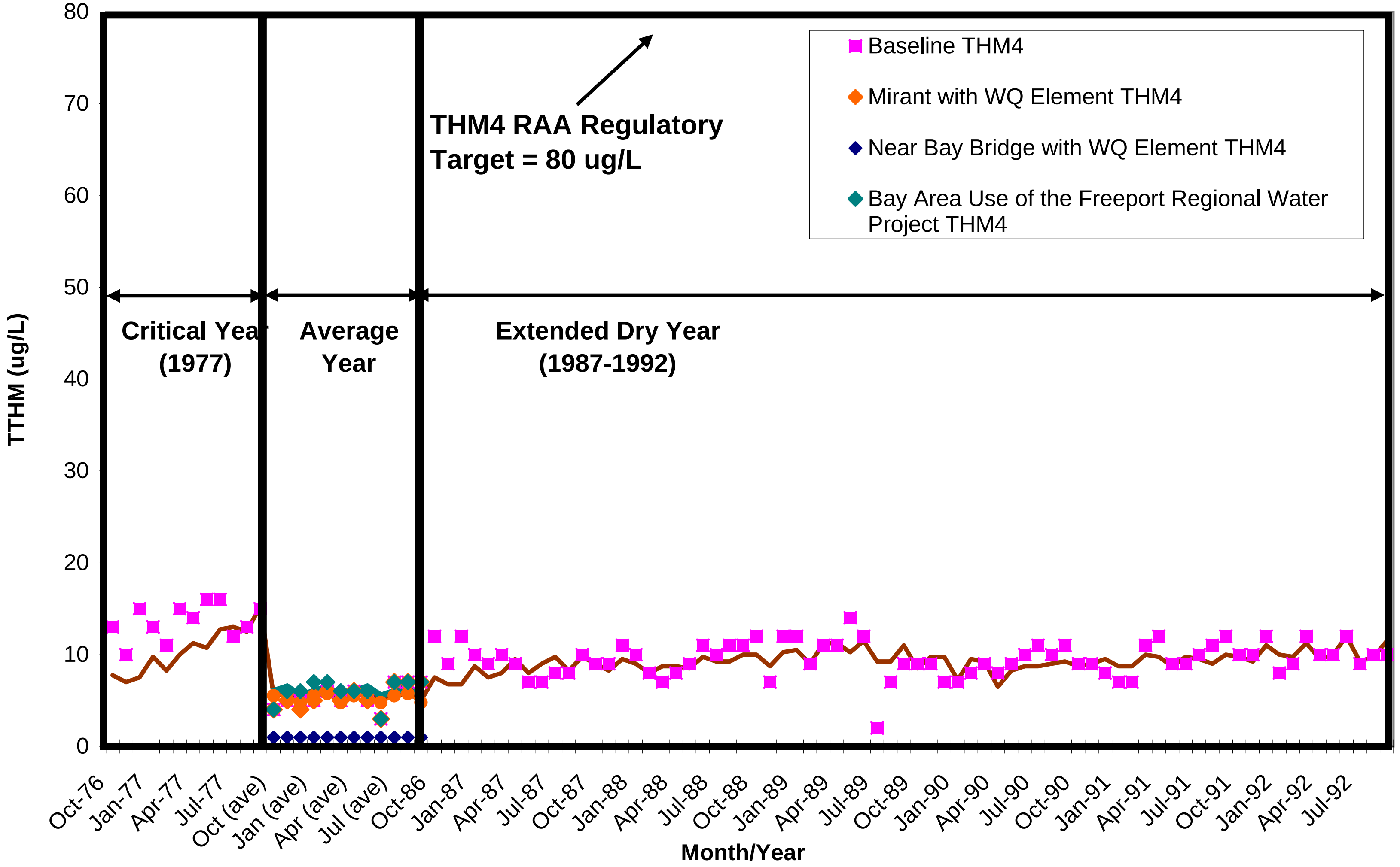
Comparison of EBMUD Baseline Source Water TDS with Concept TDS



Note: Mirant with Water Quality Element and Freeport TDS represent TDS in treated Mokelumne blend. Near Bay Bridge with Water Quality Element TDS represents TDS in pure desalinated supply and does not include blending with EBMUD supplies.

EBMUD: Comparison of Concepts

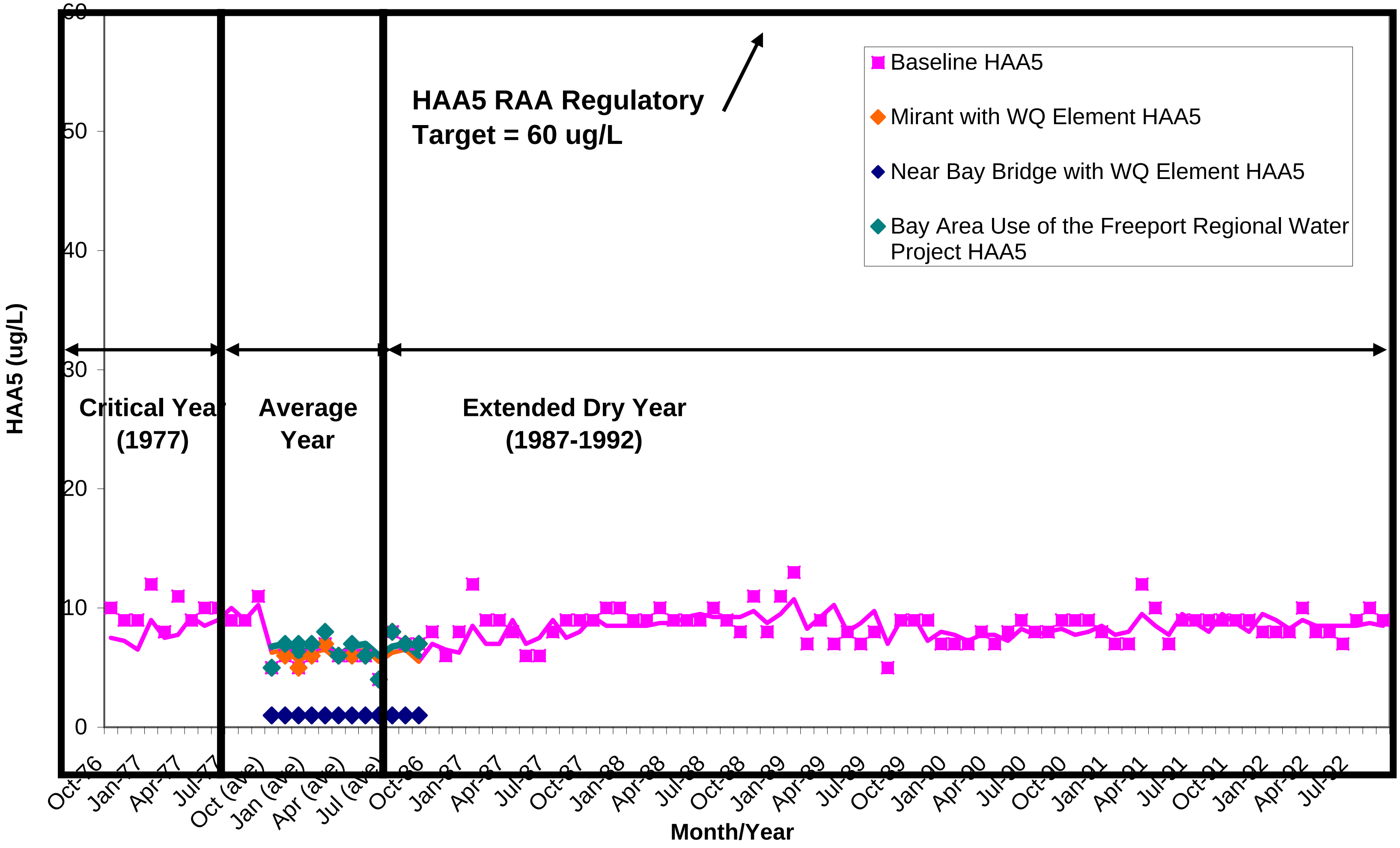
Comparison of EBMUD Baseline Source Water THM4 with Concept THM4



Note: Mirant with Water Quality Element and Freeport THM4 represent THM4 in treated Mokelumne blend. Near Bay Bridge with Water Quality Element THM4 represents THM4 in pure desalinated supply and does not include blending with EBMUD supplies. EBMUD treatment assumes settled water ozonation.

EBMUD: Comparison of Concepts

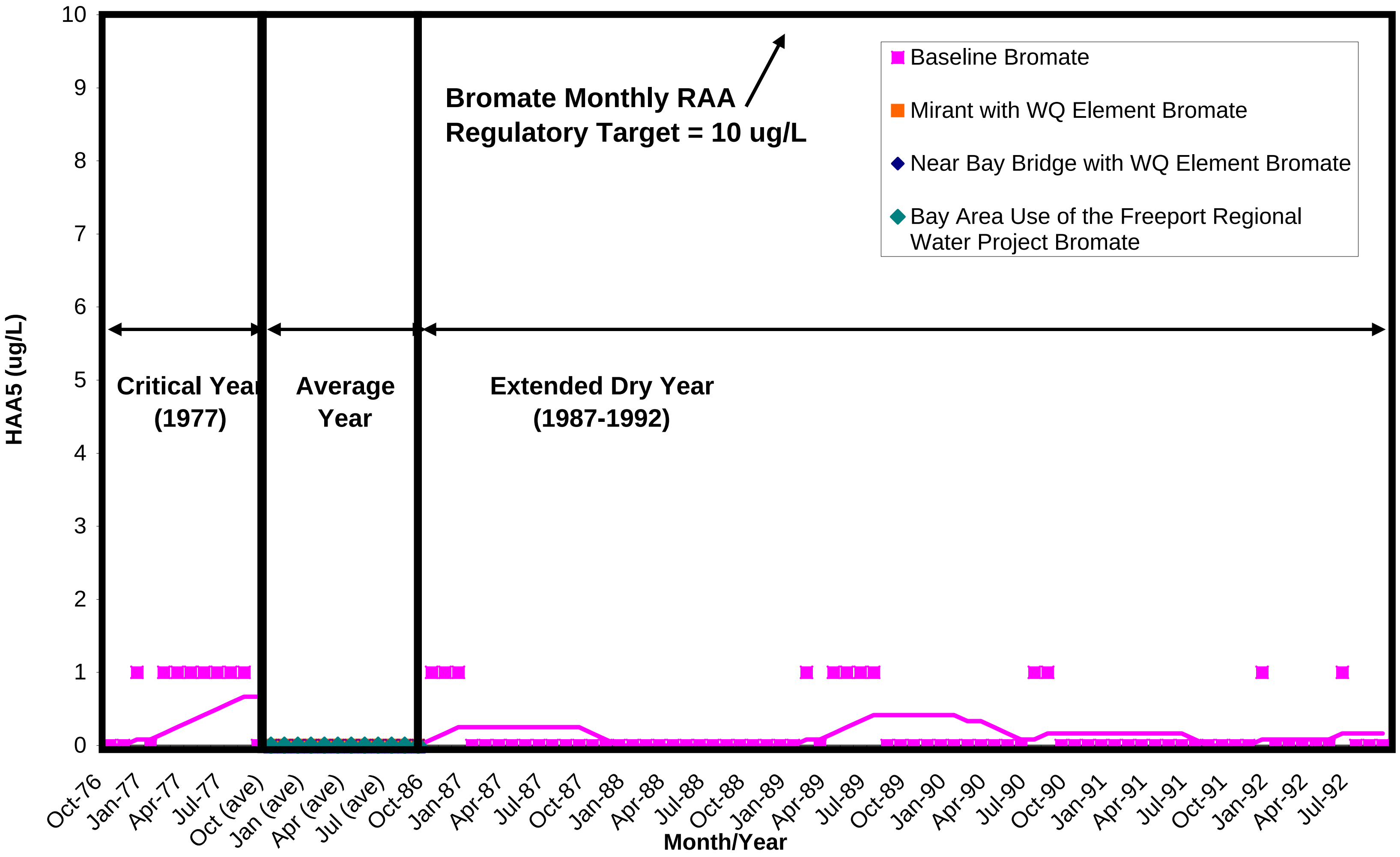
Comparison of EBMUD Baseline HAA5 with Concept HAA5



Note: Mirant with Water Quality Element and Freeport HAA5 represent HAA5 in treated Mokelumne blend. Near Bay Bridge with Water Quality Element HAA5 represents HAA5 in pure desalinated supply and does not include blending with EBMUD supplies. EBMUD treatment assumes settled water ozonation.

EBMUD: Comparison of Concepts

Comparison of EBMUD Baseline Bromate with Concept Bromate



Note: Mirant with Water Quality Element and Freeport bromate represent bromate in treated Mokelumne blend. Near Bay Bridge with Water Quality Element bromate represents bromate in pure desalinated supply and does not include blending with EBMUD supplies. EBMUD treatment assumes settled water ozonation.

G21 SCVWD Concepts

G21 Santa Clara Valley Water District : All Concepts

DESCRIPTION

Santa Clara Valley Water District (SCVWD) is a potential beneficiary for the following concepts:

- Los Vaqueros Reservoir Expansion.
- Calaveras Reservoir Expansion
- Regional Desalination Project
- East Bay Saline Groundwater Desalination
- South Bay Desalination
- Enhanced Conservation
- Recycled Water Concepts

The attached scorecard summarizes information for five of these concepts. The East Bay Saline Groundwater Desalination concept is not included in the scorecard because details of SCVWD participation in this concept will be developed as part of future studies. Enhanced conservation is not included on the scorecards because no specific conservation thresholds have been established.

SCVWD Concepts Summary

Los Vaqueros Reservoir Expansion	
Average Year Water Quality	98,000 AFY
Dry Year Supply Reliability/WQ	Up to 65,000 AFY
Calaveras Reservoir Expansion	
Average Year Water Quality	Up to 50,000 AFY
Dry Year Supply Reliability	41,000 to 53,000 AFY
Regional Desalination Project	
Average Year Water Quality	TBD in future studies
Dry Year Supply Reliability	TBD in future studies
East Bay Saline Groundwater Desalination	
Average Year Water Quality	Up to 16,000 AFY
Dry Year Supply Reliability	Up to 16,000 AFY
South Bay Desalination (Potable or Irrigation)	
Potable Average Year Water Quality	Up to 13,800 AFY
Potable Dry-Year Supply Reliability	Up to 8,300 AFY
Irrigation Supply, All Years	Up to 3,200 AFY
Enhanced Conservation	
Supply, All Years	TBD in future studies
Recycled Water Concepts	
Supply, All Years	Up to 19,700 AFY

Each of the concepts and the potential benefits for SCVWD are summarized below.

- ❑ ***Los Vaqueros Reservoir Expansion***

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability Program, study, the multipurpose operating scenario for a 500,000 acre-foot reservoir, with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the Bay Area Water Quality and Supply Reliability Program as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are Contra Costa Water District (CCWD), Alameda County Water District (ACWD), Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

Los Vaqueros studies estimate that 65,000 AFY could be delivered to SCVWD in a critically dry year (15,000 AFY entitlement delivery and 50,000 AFY dry-year supply reliability), and that 43,000 AFY could be delivered in an extended drought period (16,000 AFY entitlement delivery and 27,000 AFY dry-year supply reliability), resulting in dry-year water quality and supply reliability benefits. SCVWD would receive a water quality benefit from entitlement deliveries in average years. For 1984, which is used as an example of a normal hydrologic year, 98,000 AFY is delivered to SCVWD, the entire entitlement amount in this year.

- ❑ ***Calaveras Reservoir Expansion (water quality and supply reliability scenario)***

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 AF up to 420,000 AF. An SFPUC study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. The Bay Area Water Quality and Supply Reliability Program is evaluating potential facilities that would be required and operating scenarios that could be implemented if the reservoir were expanded to 420,000 AF. These scenarios and facilities are presented for illustrative purposes only.

Two operational scenarios are being considered for the Calaveras Reservoir expansion: 1) a water quality and dry-year supply reliability operational scenario, where up to 50,000 AFY would be delivered to South Bay Aqueduct contractors ACWD and SCVWD during average years, via a new connection to the SBA, and up to 41,000 AFY could be delivered to SFPUC (retail and wholesale customers), ACWD and SCVWD in dry years; and 2) a dry-year supply reliability scenario in which SFPUC (retail and wholesale customers), ACWD and SCVWD would potentially receive up to 53,000 AFY.

❑ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, which will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are CCWD, East Bay Municipal Utility District (EBMUD), SFPUC and SCVWD. The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water.

Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

❑ *East Bay Saline Groundwater Desalination Project*

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD (treated production capacity) desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the saline portion of the Newark Aquifer. Water would be extracted through a series of bay-shore perimeter wells within ACWD's service district area. Finished water could be pumped directly into ACWD's distribution system or into SFPUC's Bay Division Pipelines 1& 2 in its regional transmission system. Concentrate discharge could potentially be disposed of by delivering it to the East Bay Discharge Authority (EBDA) discharge pipeline, several miles north of the project area, or other options to be identified and evaluated during project planning. This concept has a potential dry-year supply reliability and average year water quality benefit of up to 16,000 AFY. Potential beneficiaries are ACWD (dry-year supply and average year water quality), SFPUC (dry-year supply only for retail and wholesale customers), and SCVWD (details to be developed in future studies).

❑ *South Bay Desalination Concept (Potable or Irrigation Supply)*

The South Bay Desalination concept could involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer. The upper aquifer is currently only used for small local domestic or agricultural purposes, or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control plant (WQCP) in Palo Alto. Each of these plants is assumed to have an intake capacity of up to 5 MGD. The end use for the desalinated supply could be for non-potable irrigation and industrial use, or for potable use. Two different target supply and water quality ranges have been selected, corresponding to the alternatives for end use. The intake capacity of 5 MGD is assumed for potable supply. However, due to recycled water supplies available for irrigation and industrial uses, demand for these purposes is lower, and production capacity is assumed to be 1 MGD per plant.

Potable supply projects at all three sites would have a potential dry-year supply benefit of up to 13,800 AFY and an average year water quality benefit of 8,300 AFY. Water quality benefits were only assumed for concepts that could potentially offset SCVWD surface water or groundwater. Irrigation supply projects at all three sites would have a potential supply benefit of 3,200 AFY in all years.

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SR Program. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

SCVWD is a potential beneficiary in three recycled water concepts totaling 19,700 AFY of supply:

- Expanded South Bay Recycling Program (16,800 AFY)
- South Santa Clara Water Recycling (1,800 AFY)
- Stanford University Recycled Water Project (100 AFY to 1,100 AFY)

Table G21-1 - Supply Reliability Score Card

Concept	Agency Baseline Amount or Description	Agency Baseline Units	Concept/Portfolio Amount or Description	Concept/Portfolio Units	Agency Baseline Plus Concept/Portfolio Amount or Description	Agency Baseline Plus Concept/Portfolio Units	Notes/Other
Meet Demand							
Critical Drought							The Calaveras Reservoir Expansion - Water Supply reports results for maximize water supply operation of a 420,000 AF expanded reservoir, for 53,000 AFY yield delivered in dry years either to the SFPUC retail and wholesale system, or to ACWD and SCVWD through interconnections with the SFPUC system and/or directly into the SBA downstream of Zone 7. No attempt has been made to allocate supplies. This would need to be evaluated as part of future studies. The Calaveras Reservoir Expansion - Water Quality reports results for maximize water quality operation of a 420,000 AF expanded reservoir, for 41,000 AFY dry-year yield and 50,000 AFY delivered in average or wet years either through interconnections with the SFPUC system, or directly into the SBA downstream of Zone 7.
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	39,400	AFY	Up to 53,000	AFY	Up to 92,400	AFY	
Calaveras Reservoir Expansion - Water Quality	39,400	AFY	Up to 41,000	AFY	Up to 80,400	AFY	
East Bay Saline Groundwater Desalination[1]	39,400	AFY	Up to 16,000	AFY	Up to 55,400	AFY	
Los Vaqueros Reservoir Expansion[3]	39,400	AFY	49,500	AFY	88,900	AFY	
Mirant Desalination with Water Quality Element	39,400	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element	39,400	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	39,400	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	39,400	AFY	Up to 3,200	AFY	Up to 42,600	AFY	
South Bay Desalination - Potable Use	39,400	AFY	Up to 13,800	AFY	Up to 53,200	AFY	
Water Recycling	39,400	AFY	Up to 19,694	AFY	39,400	AFY	
Extended Drought							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	63,000	AFY	Up to 53,000	AFY	97,800	AFY	
Calaveras Reservoir Expansion - Water Quality	63,000	AFY	Up to 41,000	AFY	97,800	AFY	
East Bay Saline Groundwater Desalination[1]	63,000	AFY	Up to 16,000	AFY	Up to 79,000	AFY	
Los Vaqueros Reservoir Expansion[3]	63,000	AFY	26,700	AFY	89,700	AFY	
Mirant Desalination with Water Quality Element	63,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element	63,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	63,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	63,000	AFY	Up to 3,200	AFY	Up to 66,200	AFY	
South Bay Desalination - Potable Use	63,000	AFY	Up to 13,800	AFY	Up to 76,800	AFY	
Water Recycling	63,000	AFY	Up to 19,694	AFY	63,000	AFY	
Average Year							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	97,800	AFY	0	AFY	97,800	AFY	
Calaveras Reservoir Expansion - Water Quality	97,800	AFY	Up to 50,000	AFY	97,800	AFY	
East Bay Saline Groundwater Desalination[1]	97,800	AFY	Up to 16,000	AFY	97,800	AFY	
Los Vaqueros Reservoir Expansion[3]	97,800	AFY	0	AFY	97,800	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	97,800	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	97,800	AFY	Up to 3,200	AFY	97,800	AFY	
South Bay Desalination - Potable Use	97,800	AFY	Up to 8,300	AFY	97,800	AFY	
Water Recycling	97,800	AFY	Up to 19,694	AFY	97,800	AFY	
Vulnerability							
Bay Area Use of the Freeport Regional Water Project	Delta supply sources susceptible to liquefaction of Delta levees.		N/A				
Calaveras Reservoir Expansion - Water Supply			Reduces Vulnerability - Calaveras Reservoir expansion reduces vulnerability of ACWD and SCVWD to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or South Bay PP.				
Calaveras Reservoir Expansion - Water Quality							
East Bay Saline Groundwater Desalination[1]			TBD[1]				
Los Vaqueros Reservoir Expansion[3]			Reduces Vulnerability - Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or Sout				
Mirant Desalination with Water Quality Element			TBD[2]				
Near Bay Bridge Desalination with Water Quality Element			TBD[2]				
Regional Desalination Project			TBD[2]				
South Bay Desalination - Irrigation Use			No Effect on Vulnerability - This concept provides nonpotable supply and will not affect the vulnerability of the SCVWD potable system.				
South Bay Desalination - Potable Use			Reduces Vulnerability - Could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption of imported supply, but only a small fraction of SCVWD customers could be served.				
Water Recycling			No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems of potential participating agencies.				
Self-Sufficiency within the Region							
Bay Area Use of the Freeport Regional Water Project	No Effect on Self-Sufficiency within the Region - Agreements required with EBMUD, who would control project operation. Project implementation would not only require agreements between Zone 7 and EBMUD, but could involve the State of California (changes t						
Calaveras Reservoir Expansion - Water Supply	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
Calaveras Reservoir Expansion - Water Quality	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
East Bay Saline Groundwater Desalination[1]	Increases Self-Sufficiency within the Region - Project would be locally controlled.						
Los Vaqueros Reservoir Expansion[3]	Increases Self-Sufficiency within the Region - Under all institutional structures, CCWD would retain ownership and control of the watershed and operations of the project (CALFED, 2004). An ownership agreement would be developed outlining this. A governi						
Mirant Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would contro						
Near Bay Bridge Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would cont						
Regional Desalination Project	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled.						
South Bay Desalination - Irrigation Use	Increases Self-Sufficiency within Region - Project would be locally controlled.						
South Bay Desalination - Potable Use	Increases Self-Sufficiency within Region - Project would be locally controlled.						
Water Recycling	Increases Self-Sufficiency within Region. Concepts will be owned, operated, and controlled locally.						

1. Details of potential SCVWD participation in the East Bay Saline Groundwater Desalination Concept to be developed in future studies.
2. Mirant and Near Bay Bridge with Water Quality Element concepts consist of average and wet year water quality deliveries to Zone 7, and are dependent upon the base desalination facility, which is part of the Regional Desalination Project. Shaded cells reflect potential benefits associated with the base desalination facility, to be determined by the RDP. All RDP partners will benefit from the desalination facility in dry years. The quantity and operations will be determined in future phases of the RDP process. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.
3. Los Vaqueros Reservoir Expansion concept supply quantities reflect supply reliability increment only and do not include EWA water. Supply quantities exclude Semitropic groundwater banking program deliveries.

Table G21-2 - Public Health Protection Scorecard (Page 1 of 2)

	Concept		Agency Baseline Plus Concept		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus SCVWD Source Water**	**Concept Plus SCVWD Treated Water**	**Notes**
Variability for Treatment					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
Calaveras Reservoir Expansion - Water Quality	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
East Bay Saline Groundwater Desalination[1]	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
South Bay Desalination - Potable Use	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Total Dissolved Solids					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
Calaveras Reservoir Expansion - Water Quality	NA	NA	Reduces TDS	NA	Reduction in TDS for all hydrologies
East Bay Saline Groundwater Desalination[1]	Reduces TDS	Reduces TDS	NA	NA	Reduced TDS for customers receiving East Bay Saline Groundwater Desalinated water
Los Vaqueros Reservoir Expansion	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will be substantially higher in TDS (up to 500 mg/L) than potable supplies, but will have no effect on potable water quality.
South Bay Desalination - Potable Use	NA	No Effect on TDS	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS.
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Disinfection By-Products					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
East Bay Saline Groundwater Desalination[1]	Reduces DBPs	Reduces DBPs	NA	NA	Improved overall quality
Los Vaqueros Reservoir Expansion	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will likely be lower in DBPs than potable supplies, due to lower chlorine demand from RO treatment, but will have no effect on potable water quality.
South Bay Desalination - Potable Use	NA	Reduces DBPs	NA	NA	Desalinated supplies for potable use will be significantly lower in DBPs than usual supplies, due to lower chlorine demand.
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		

1. Details of potential SCVWD participation in the East Bay Saline Groundwater Desalination Concept to be developed in future studies.
2. To be determined in future studies.

Table G21-2 - Public Health Protection Scorecard (Page 2 of 2)

	Concept		**Baseline Plus Concept**		
Performance Measure/Objective	**SCVWD Source Water**	**SCVWD Treated Water**	**SCVWD Source Water**	**SCVWD Treated Water**	**Notes**
Taste and Odor Problems (Excluding TDS)					
Bay Area Use of the Freeport Regional Water Project					
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	Improves T&O	Improvement in source water quality
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	Improves T&O	Improvement in source water quality
East Bay Saline Groundwater Desalination [1]	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
Los Vaqueros Reservoir Expansion	NA	NA	NA	Improves T&O	
Mirant Desalination with Water Quality Element					
Near Bay Bridge Desalination with Water Quality Element					
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will not be potable.
South Bay Desalination - Potable Use	NA	No Effect on T&O	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Desalinated supplies will have significantly lower TOC than usual supplies, but hig
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
Bay Area Use of the Freeport Regional Water Project					
Calaveras Reservoir Expansion - Water Supply	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Calaveras Reservoir Expansion - Water Quality	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	
East Bay Saline Groundwater Desalination [1]	NA	NA	Reduces Potential for Degradation	NA	East Bay Saline Groundwater Desalination treated water quality is comparable to SFPUC water quality (improved quality compared to SBA source).
Los Vaqueros Reservoir Expansion	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Mirant Desalination with Water Quality Element					
Near Bay Bridge Desalination with Water Quality Element					
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	Increases Potential for Degradation	Increases Potential for Degradation	NA	NA	Increased TDS in desalinated supplies displacing potable supplies used for the same purpose could have effects on the groundwater salt balance.
South Bay Desalination - Potable Use	NA	No Effect on Potential for Degradation	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Bromide levels will be well below SCVWD averages, and a significant reduction in TO
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
Bay Area Use of the Freeport Regional Water Project					
Calaveras Reservoir Expansion - Water Supply	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
Calaveras Reservoir Expansion - Water Quality	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	
East Bay Saline Groundwater Desalination [1]	NA	NA	No Effect on Potential for Degradation	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
Los Vaqueros Reservoir Expansion	NA	NA	TBD[2]	TBD[2]	Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
Mirant Desalination with Water Quality Element					
Near Bay Bridge Desalination with Water Quality Element					
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	No Effect on Potential for Degradation	No Effect on Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
South Bay Desalination - Potable Use	NA	No Effect on Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
Water Recycling	Increases Potential for Degradation	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with adva		

1. Details of potential SCVWD participation in the East Bay Saline Groundwater Desalination Concept to be developed in future studies.
2. To be determined in future studies.

Table G21-2a - Public Health Protection Score Card by Agency

Concept: Los Vaqueros Reservoir Expansion

			Agency Baseline		Quantity of Water Conveyed through the Expanded Reservoir[1]		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**Los Vaqueros Expansion Concept Source Water**	**Los Vaqueros Expansion Concept Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	39,400		49,500		88,900		
Extended Dry Year		AFY	63,000		26,700		89,700		
Average Year		AFY	97,800		0		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	NA	0.09 - 0.24	0.06 - 0.17	
	Mean	mg/L	0.37	0.33	NA	NA	0.12	0.08	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	NA	1.8 - 3.4	2.8 - 4.2	
	Mean	mg/L	5.1	3.9	NA	NA	2.4	3.3	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	NA	0.02 - 0.44	0.01 - 0.36	
	Mean	mg/L	0.26	0.24	NA	NA	0.15	0.11	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	NA	1.6 - 6.3	1.8 - 5.7	
	Mean	mg/L	3.7	2.7	NA	NA	2.7	3.0	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	NA	0.10 - 0.15	0.07 - 0.11	
	Mean	mg/L	0.19	0.17	NA	NA	0.12	0.09	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	NA	1.6 - 1.6	2.7 - 2.7	
	Mean	mg/L	4.0	3.0	NA	NA	1.6	2.7	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	NA	187 - 355	206 - 375	
	Mean	mg/L	507	527	NA	NA	221	241	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	NA	147 - 597	167 - 617	
	Mean	mg/L	384	404	NA	NA	253	273	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	NA	192 - 251	211 - 271	
	Mean	mg/L	296	316	NA	NA	218	238	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	NA	NA	2 - 4	
	Mean	mg/L	NA	6	NA	NA	NA	2	
THM4	Range	mg/L	NA	27 - 44	NA	NA	NA	22 - 32	
	Mean	mg/L	NA	34	NA	NA	NA	25	
HAA5	Range	mg/L	NA	11 - 14	NA	NA	NA	12 - 14	
	Mean	mg/L	NA	13	NA	NA	NA	13	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	NA	NA	ND - 7	
	Mean	mg/L	NA	4	NA	NA	NA	3	
THM4	Range	mg/L	NA	16 - 40	NA	NA	NA	16 - 39	
	Mean	mg/L	NA	27	NA	NA	NA	24	
HAA5	Range	mg/L	NA	7 - 18	NA	NA	NA	10 - 16	
	Mean	mg/L	NA	11	NA	NA	NA	12	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	NA	NA	2 - 3	
	Mean	mg/L	NA	3	NA	NA	NA	2	
THM4	Range	mg/L	NA	22 - 34	NA	NA	NA	22 - 23	
	Mean	mg/L	NA	27	NA	NA	NA	23	
HAA5	Range	mg/L	NA	9 - 15	NA	NA	NA	11 - 12	
	Mean	mg/L	NA	12	NA	NA	NA	12	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		moderate	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Supply reflected inlcudes all water delivered vis the expanded reservoir for EWA and supply reliability. Concept supply quantities do not include Semitropic groundwater banking program deliveries.

Table G21-2b - Public Health Protection Score Card by Agency

Concept: Calaveras Reservoir Expansion (Maximize Supply Reliability)

			Agency Baseline		**Concept**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**Calaveras Expansion Concept Source Water**	**Calaveras Expansion Concept Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	39,400		NA		92,400		
Extended Dry Year		AFY	63,000		NA		97,800		
Average Year		AFY	97,800		NA		NA		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	NA	0.17 - 0.20	0.15 - 0.18	
	Mean	mg/L	0.37	0.33	NA	NA	0.19	0.17	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	NA	3.0 - 4.9	2.1 - 3.7	
	Mean	mg/L	5.1	3.9	NA	NA	3.8	2.8	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	NA	0.05 - 0.20	0.04 - 0.18	
	Mean	mg/L	0.26	0.24	NA	NA	0.16	0.14	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	NA	1.7 - 6.8	1.0 - 5.4	
	Mean	mg/L	3.7	2.7	NA	NA	3.3	2.4	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	NA	NA	NA	
	Mean	mg/L	0.19	0.17	NA	NA	NA	NA	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	NA	NA	NA	
	Mean	mg/L	4.0	3.0	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	NA	NA	NA	NA	
Temperature	Qual		variable	less variable	NA	NA	NA	NA	
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	NA	276 - 286	296 - 305	
	Mean	mg/L	507	527	NA	NA	285	305	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	NA	166 - 293	185 - 313	
	Mean	mg/L	384	404	NA	NA	249	269	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	NA	NA	NA	
	Mean	mg/L	296	316	NA	NA	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	NA	NA	3 - 3	
	Mean	mg/L	NA	6	NA	NA	NA	3	
THM4	Range	mg/L	NA	27 - 44	NA	NA	NA	23 - 31	
	Mean	mg/L	NA	34	NA	NA	NA	27	
HAA5	Range	mg/L	NA	11 - 14	NA	NA	NA	11 - 13	
	Mean	mg/L	NA	13	NA	NA	NA	12	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	NA	NA	1 - 3	
	Mean	mg/L	NA	4	NA	NA	NA	3	
THM4	Range	mg/L	NA	16 - 40	NA	NA	NA	16 - 34	
	Mean	mg/L	NA	27	NA	NA	NA	23	
HAA5	Range	mg/L	NA	7 - 18	NA	NA	NA	8 - 18	
	Mean	mg/L	NA	11	NA	NA	NA	11	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	NA	NA	NA	
	Mean	mg/L	NA	3	NA	NA	NA	NA	
THM4	Range	mg/L	NA	22 - 34	NA	NA	NA	NA	
	Mean	mg/L	NA	27	NA	NA	NA	NA	
HAA5	Range	mg/L	NA	9 - 15	NA	NA	NA	NA	
	Mean	mg/L	NA	12	NA	NA	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		moderate	NA	NA	NA	minimal	NA	Potential reservoir mixing issues

Table G21-2c - Public Health Protection Score Card by Agency

Concept: Calaveras Reservoir Expansion (Maximize Water Quality) [1]

			Agency Baseline		**Concept**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**Calaveras Expansion Concept Source Water**	**Calaveras Expansion Concept Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	39,400		41,000		80,400		
Extended Dry Year		AFY	63,000		41,000		97,800		
Average Year		AFY	97,800		50,000		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	NA	0.17 - 0.23	0.15 - 0.20	
	Mean	mg/L	0.37	0.33	NA	NA	0.21	0.19	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	NA	3.1 - 5.2	2.2 - 4.0	
	Mean	mg/L	5.1	3.9	NA	NA	4.0	3.0	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	NA	0.05 - 0.23	0.04 - 0.21	
	Mean	mg/L	0.26	0.24	NA	NA	0.17	0.15	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	NA	1.7 - 6.8	1.0 - 5.4	
	Mean	mg/L	3.7	2.7	NA	NA	3.4	2.4	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	NA	0.08 - 0.11	0.07 - 0.12	
	Mean	mg/L	0.19	0.17	NA	NA	0.10	0.10	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	NA	2.2 - 4.3	1.4 - 3.2	
	Mean	mg/L	4.0	3.0	NA	NA	3.3	2.3	
pH	Qual		somewhat variable	less variable	NA	NA	somewhat variable	constant	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	variable	less variable	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	NA	276 - 315	296 - 335	
	Mean	mg/L	507	527	NA	NA	312	332	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	NA	166 - 324	185 - 343	
	Mean	mg/L	384	404	NA	NA	266	286	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	NA	173 - 195	192 - 215	
	Mean	mg/L	296	316	NA	NA	182	202	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	NA	NA	3 - 4	
	Mean	mg/L	NA	6	NA	NA	NA	4	
THM4	Range	mg/L	NA	27 - 44	NA	NA	NA	24 - 33	
	Mean	mg/L	NA	34	NA	NA	NA	28	
HAA5	Range	mg/L	NA	11 - 14	NA	NA	NA	11 - 14	
	Mean	mg/L	NA	13	NA	NA	NA	12	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	NA	NA	1 - 4	
	Mean	mg/L	NA	4	NA	NA	NA	3	
THM4	Range	mg/L	NA	16 - 40	NA	NA	NA	16 - 34	
	Mean	mg/L	NA	27	NA	NA	NA	24	
HAA5	Range	mg/L	NA	7 - 18	NA	NA	NA	8 - 18	
	Mean	mg/L	NA	11	NA	NA	NA	11	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	NA	NA	1 - 2	
	Mean	mg/L	NA	3	NA	NA	NA	2	
THM4	Range	mg/L	NA	22 - 34	NA	NA	NA	18 - 27	
	Mean	mg/L	NA	27	NA	NA	NA	23	
HAA5	Range	mg/L	NA	9 - 15	NA	NA	NA	9 - 13	
	Mean	mg/L	NA	12	NA	NA	NA	12	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	improved overall quality	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		moderate	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

1. Critical and Extended Dry Year water quality evaluations assume delivery of 41,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7. Average year water quality evaluation assumes delivery of 50,000 AFY of Calaveras Reservoir supply to the SBA downstream of Zone 7.

Table G21-2d - Public Health Protection Score Card by Agency

Concept: South Bay Desalination (Potable Use)

			Agency Baseline		Concept		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**South Bay Desalination Potable Use Source Water**	**South Bay Desalination Potable Use Treated Water**	**Agency Baseline Plus South Bay Desalination - Potable Use Source Water**	**Agency Baseline Plus South Bay Desalination - Potable Use Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	39,400		13,800		53,200		
Extended Dry Year		AFY	63,000		13,800		76,800		
Average Year		AFY	97,800		8,300		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.37	0.33	NA	0.08	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	5.1	3.9	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.26	0.24	NA	0.08	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	3.7	2.7	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.19	0.17	NA	0.08	NA	NA	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	4.0	3.0	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	40 - 280	NA	NA	
	Mean	mg/L	507	527	NA	160	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	40 - 280	NA	NA	
	Mean	mg/L	384	404	NA	160	NA	NA	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	40 - 280	NA	NA	
	Mean	mg/L	296	316	NA	160	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	ND	NA	NA	
	Mean	mg/L	NA	6	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	27 - 44	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	34	NA	1	NA	NA	
HAA5	Range	mg/L	NA	11 - 14	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	13	NA	2	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	ND	NA	NA	
	Mean	mg/L	NA	4	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	16 - 40	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	27	NA	1	NA	NA	
HAA5	Range	mg/L	NA	7 - 18	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	11	NA	2	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	ND	NA	NA	
	Mean	mg/L	NA	3	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	22 - 34	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	27	NA	1	NA	NA	
HAA5	Range	mg/L	NA	9 - 15	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	12	NA	2	NA	NA	
Minimize Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	

1. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Table G21-2e - Public Health Protection Score Card by Agency [1,2]

Concept: East Bay Saline Groundwater Desalination

			Agency Baseline		**Concept**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SCVWD Source Water (SWP)**	**SCVWD Treated Water (SWP)**	**East Bay Saline Groundwater Desal Source Water**	**East Bay Saline Groundwater Desal Treated Water**	**Agency Baseline Plus East Bay Saline Groundwater Source Water**	**Agency Baseline Plus East Bay Saline Groundwater Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	39,400		16,000		55,400		
Extended Dry Year		AFY	63,000		16,000		79,000		
Average Year		AFY	97,800		16,000		97,800		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.17 - 0.53	0.15 - 0.48	NA	0.02	NA	NA	
	Mean	mg/L	0.37	0.33	NA	0.02	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	2.4 - 5.8	NA	0.1	NA	NA	
	Mean	mg/L	5.1	3.9	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.47	NA	0.02	NA	NA	
	Mean	mg/L	0.26	0.24	NA	0.02	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	0.9 - 5.8	NA	0.1	NA	NA	
	Mean	mg/L	3.7	2.7	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.08 - 0.38	0.07 - 0.35	NA	0.02	NA	NA	
	Mean	mg/L	0.19	0.17	NA	0.02	NA	NA	
TOC	Range	mg/L	2.8 - 0.0	1.9 - 4.6	NA	0.1	NA	NA	
	Mean	mg/L	4.0	3.0	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	276 - 704	296 - 724	NA	40	NA	NA	
	Mean	mg/L	507	527	NA	40	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	185 - 695	NA	40	NA	NA	
	Mean	mg/L	384	404	NA	40	NA	NA	
Average Year	Range	mg/L	180 - 528	199 - 548	NA	40	NA	NA	
	Mean	mg/L	296	316	NA	40	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	3 - 9	NA	ND	NA	NA	
	Mean	mg/L	NA	6	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	27 - 44	NA	ND	NA	NA	
	Mean	mg/L	NA	34	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	11 - 14	NA	1	NA	NA	
	Mean	mg/L	NA	13	NA	1	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	1 - 8	NA	ND	NA	NA	
	Mean	mg/L	NA	4	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	16 - 40	NA	ND	NA	NA	
	Mean	mg/L	NA	27	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	7 - 18	NA	1	NA	NA	
	Mean	mg/L	NA	11	NA	1	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	1 - 6	NA	ND	NA	NA	
	Mean	mg/L	NA	3	NA	ND	NA	NA	
TTHM	Range	mg/L	NA	22 - 34	NA	ND	NA	NA	
	Mean	mg/L	NA	27	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	9 - 15	NA	1	NA	NA	
	Mean	mg/L	NA	12	NA	1	NA	NA	
Minimize Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		moderate	NA	NA	NA	NA	NA	

1. East Bay Saline Groundwater Desalination concept assumes target TDS of 40 mg/L.

2. Details of SCVWD participation to be determined in future studies. Water quality analysis assumes treated East Bay Saline GW Desalinated supply is blended in the SCVWD distribution system.

Table G21-3 - Cost, Environmental and Implementation Score Card (Page 1 of 5)

Performance Measure/Objective	Concept	Concept	Amount or Rating	Notes/Other
Cost Impacts				
Cost Impacts	Bay Area Use of the Freeport Regional Water Project	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Supply	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing st
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Calaveras Reservoir Expansion - Water Quality	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing st
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	East Bay Saline Groundwater Desalination	Capital Cost	TBD[1]	Capital costs associated with the desalination on-site facilities are projected to be $75 million ($2005). Capital costs of ancillary facilities and conveyance, operating and life-cycle costs to be determined as part of future studies.
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Los Vaqueros Reservoir Expansion	Capital Cost	$1500M (2008 $)	Cost estimates from CALFED Los Vaqueros Expansion Studies (CALFED, 2004). Annual costs and potential cost-sharing options will be evaluated in future phases of the CALFED Los Vaqueros Reservoir Expansion studies.
		Operating & Maintenance Cost	$27.5M (2008 $)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Mirant Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Near Bay Bridge Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	NA	
	Regional Desalination Project	Capital Cost	TBD[1]	Specific capital costs, operating costs and lifecycle costs will depend on location and operation of facilities. The Regional Desalination Project Phase 1 report included capital costs ($2003) ranging from $168M to $285M for a 40-MGD plant at each of the
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	South Bay Desalination - Irrigation Use	Capital Cost	$14 - $17 M	Conceptual-level capital costs are estimated at $14 - 17M, depending on finished water quality. Operational costs estimated at $2.6 M/year. Lifecycle costs are projected to be approximately $3.6 - $3.8 M/year. Unit costs are $1,100/AF.
		Operating & Maintenance Cost	$2.6 M/Year	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	$3.6 - $3.8 M	
		Allocation of Costs	N/A	
	South Bay Desalination - Potable Use	Capital Cost	$41 - $138 M	Conceptual-level capital costs are estimated at $41 - 138M, depending on finished water quality. Operational costs estimated at $8.8 - $9.5 M/year. Lifecycle costs are projected to be approximately $12.4 - $18.8 M/year. Unit costs are $860 - $1,390/AF
		Operating & Maintenance Cost	$8.8 - $9.5 M/Yr	
		Environmental Mitigation Cost	Included in capital cost	
		Lifecycle Cost	$12.4 - $18.8 M/Yr	
		Allocation of Costs	N/A	
	Water Recycling	Capital Cost	Up to $273 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
		Operating & Maintenance Cost	Up to $7.8 M/Yr	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	Up to $28 M/Yr	
		Allocation of Costs	Up to $1,582/AF	

1. To be determined in future studies.

Table G21-3 - Cost, Environmental and Implementation Score Card (Page 2 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Impacts to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Overall Impacts to the Environment (Before Mitigation): High Impact.** Potential effects are primarily associated with aquatic and terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land and water resources. In addition, other facility development could also affect sensitive biological resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts in and around the watershed at a 3:1 ratio or at a ratio that is deemed appropriate by regulatory agencies.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the concept facilities would primarily consist of temporary, construction-related effects. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities to reduce construction and operation impacts include alternative siting of facilities to avoid sensitive resources to the extent feasible, preconstruction surveys (e.g., for special-status species), implementation of site-specific measures (e.g., monitoring during construction, use of exclusionary fencing, restoration), restriction on construction schedule (e.g., during breeding / nesting season of certain bird species if their nests are found nearby), etc. These mitigation measures would ensure that short-term effects are reduced.	
	Los Vaqueros Reservoir Expansion	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Potential effects are primarily associated with terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land. However, design of the facility would benefit aquatic resources, thus offsetting impacts to terrestrial resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts on existing watershed lands and lands owned by potential partner agencies or open space managers. In addition, acquisition of additional land for protection, restoration, and/or enhancement would occur. Mitigation acreage would range from 1,953 to 8,576 acres. Effects on recreation would be offset by the restoration and augmentation of trails (increase in 17 miles of trails).	
	Mirant Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Regional Desalination Project	TBD[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the concept facilities would primarily consist of temporary construction-related effects. Siting of facilities (e.g., groundwater wells) may result in direct effects to sensitive resources depending on the location. No long-term operational effects are expected if brine discharge complies with existing NPDES permit. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G21-3 - Cost, Environmental and Implementation Score Card (Page 3 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Benefits to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If the Water Quality concept is chosen, the concept has the potential to reduce Delta fisheries impacts, as it would reduce pumping during the normal and wet years. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Protection, restoration, and enhancement of habitat for plants and wildlife species would be considered a benefit since the acreage protected, restored, or enhanced would likely exceed that affected by concept implementation.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Implementation of this concept would slightly reduce pumping from the Delta, and thus would be considered an environmental benefit to Delta resources.	
	Los Vaqueros Reservoir Expansion	**Overall Benefits to the Environment (Before Mitigation): High Benefits.** Potential benefits associated with the proposed concept include the following: - Installation of state-of-the-art fish screens for diversions to the SBA, - Flexibility to shift the timing and location of water diversions to protect fish, - System flexibility to store and move water (including for environmental water storage); also, provision of additional storage (for natural disasters, toxic spills, or levee failures in the Delta). **Overall Benefits to the Environment (After Mitigation): High Benefits.** Benefits would then be associated with increased protected and restored land as well as additional recreation opportunities (see mitigation opportunities above).	
	Mirant Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Regional Desalination Project	**TBD**[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source (Santa Clara – Pico Power Plant Site only) to offset SCVWD during normal years reduces spring and summer pumping from the Delta, there would be a benefit to the Delta. Incremental benefits to the environment from implementation of the concept at the other sites are not expected. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** The potential benefits associated with the proposed concepts include offsetting the development of higher capacity water supply projects. This translates to a potential reduction in environmental impacts associated with the construction and operation of larger water-related facilities. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G21-3 - Cost, Environmental and Implementation Score Card (Page 4 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Implementation Potential			
External Support	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	TBD^1 - Historically, use of desalination, water recycling and enhanced conservation rather than storage concepts have been viewed as environmentally friendly alternatives and generated more support than storage projects.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	TBD^1 - Use of desalination, water recycling and enhanced conservation rather than storage concepts is likely to be viewed as an environmentally friendly alternative and generate external support.	
	Los Vaqueros Reservoir Expansion	TBD^1	
	Mirant Desalination with Water Quality Element	TBD^1	
	Near Bay Bridge Desalination with Water Quality Element	TBD^1	
	Regional Desalination Project	TBD^2 - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	TBD^1 - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
	South Bay Desalination - Potable Use		
	Water Recycling	TBD^1 - Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.	
Ability to Get Outside Funding	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	TBD^1	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	TBD^1 - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation rather than storage concepts, as well as the large number of benefiting agencies, has historically increased the likelihood of external funding.	
	Los Vaqueros Reservoir Expansion	TBD^1	
	Mirant Desalination with Water Quality Element	TBD^1	
	Element	TBD^1	
	Regional Desalination Project	TBD^2 - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	TBD^1 - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
	South Bay Desalination - Potable Use		
	Water Recycling	TBD^1 - The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds	
Consistency with Local and Regional Plans	All concepts	NA - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	

1. To be determined in future studies.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G21-3 - Cost, Environmental and Implementation Score Card (Page 5 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Regional Perspective			
Number of Agencies Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	3	ACWD, SCVWD, SFPUC (retail and wholesale)
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	2	ACWD, SFPUC
	Los Vaqueros Reservoir Expansion	4	ACWD, CCWD, SCVWD, Zone 7, SFPUC
	Mirant Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Near Bay Bridge Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Regional Desalination Project	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	3	BAWSCA, SFPUC, SCVWD
	South Bay Desalination - Potable Use		
	Water Recycling	6,000,000 people	
Population Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	4,700,000 people	
	Calaveras Reservoir Expansion - Water Quality	4,700,000 people	
	East Bay Saline Groundwater Desalination	2,200,000 people	
	Los Vaqueros Reservoir Expansion	4,400,000 people	
	Mirant Desalination with Water Quality Element	280,000 people	
	Near Bay Bridge Desalination with Water Quality Element	280,000 people	
	Regional Desalination Project	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	3,700,000 people	
	South Bay Desalination - Potable Use		
	Water Recycling	6,000,000 people	

1. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G21-4 - Environmental Score Card (Page 1 of 5)

Measure/Objective	Concept	Concept Rating
Aquatic Environment		
Potential Impacts to Aquatic Environment	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could then affect habitat for fish. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this would require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions). In addition, continue trout planting.
	Calaveras Reservoir Expansion - Water Quality	
	East Bay Saline Groundwater Desalination	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources). Effects on aquatic resources from brine discharge are not expected if brine is mixed and diluted with wastewater prior to discharge (e.g., use of EBDA facilities). Construction of concept facilities (desal plant, wells, and pipeline) would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Los Vaqueros Reservoir Expansion	**Effects on Aquatic Environment (Before Mitigation). Benefits.** Reduces direct fish losses from water diversions (incremental increase in loss of juvenile fish at the new Delta intakes offset by a substantial reduction in direct fish loss at the SWP [or CVP] diversion facility), through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). **Effects on Aquatic Environment (After Mitigation): No Effect.** The concept was designed to minimize potential effects to aquatic environment. Thus, no mitigation measures would be required.
	Mirant Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 15,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 10,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources) and brine would be combined with WQCP effluent or power plant blow-down water (to allow for mixing and dilution prior to discharge). Construction of concept facilities (desal plant, wells, and pipeline) could result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.

[1] Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G21-4 - Environmental Score Card (Page 2 of 5)

Performance	Concept	Concept Rating	Notes
Terrestrial Environment			
Potential Impacts to Terrestrial Environment (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Direct effects from inundation of terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and an area of potential serpentine associated plants. Additional disturbed acreage associated with construction of other facilities (e.g., pipeline, pump station). **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed. In addition, consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Restoration of affected habitat may occur at a 3:1 ratio, or as negotiated with regulatory agencies.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The locations of concept facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, the location of these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new pipelines are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.	
	Los Vaqueros Reservoir Expansion	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Total direct effects from both reservoir expansion and facilities construction: - Total direct effects to terrestrial habitat of up to 2,595 acres (permanent and temporary). - 2,081 acres of grassland - 309 acres of oak woodland - 11 acres of chaparral / upland scrub - 0.01 acre of riparian - 3.6 acres of urban-ruderal - 189 acres of agriculture - 1,960 acres from inundation. **Effects on Terrestrial Environment (After Mitigation): Benefits.** The Mitigation strategy would provide for resource enhancement in accordance with CALFED Program guidance and in coordination with regional conservation. It includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres (CALFED, 2004).	
	Mirant Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.	
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been established, so the actual biological effects cannot be determined. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.	
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.	
	South Bay Desalination - Irrigation Use	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual terrestrial effects cannot be defined or quantified. However, these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if other facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for each concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.	

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G21-4 - Environmental Score Card (Page 3 of 5)

Measure/Objective	Concept	Concept Rating	Notes
Wetlands			
Potential Impacts to Wetlands (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Effects on Wetlands (Before Mitigation): Impacts.** Direct effects to marsh habitat from inundation. Siting of other permanent facilities and construction of conveyance facilities may also affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities would be similar to those described above for Terrestrial Environment. Affected lands would be restored at a ratio deemed appropriate by regulatory agencies.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Effects on Wetlands (Before Mitigation): Impacts.** A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of other facilities could temporarily affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).	
	Los Vaqueros Reservoir Expansion	**Effects on Wetlands (Before Mitigation): Impacts.** Total direct effects from inundation would be 1.3 acres. **Effects on Wetlands (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes wetlands.	
	Mirant Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but not be limited to, restriction on the construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.	
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, such effects would likely be temporary in nature. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but are not be limited to, restriction on construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.	
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.	
	South Bay Desalination - Irrigation Use	**Effects on Wetlands (Before Mitigation): Impacts.** As described above, the majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual biological effects cannot be defined or quantified. Other facilities would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may require replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).	
	South Bay Desalination - Potable Use		
	Water Recycling	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).	

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G21-4 - Environmental Score Card (Page 4 of 5)

Performance	Concept	Concept Rating	Notes
Special-Status Species			
Potential Impacts to Special-Status Species (number of species)	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply .	
	Los Vaqueros Reservoir Expansion	**Effects on Special-Status Species (Before Mitigation): Impacts.** Each habitat type identified under "terrestrial environment," above, is associated with special status species, including but not limited to: - San Joaquin kit fox, - California red-legged frog, - California tiger salamander, - Western pond turtle, - Bald eagle, - Curved-foot hygrotis diving beetle, - Mason's lilaeopsis, - Alkali milk-vetch, - Heartscale, - Brittlescale, - San Joaquin spearscale, - Recurved larkspur, - Contra Costa goldfields, - Vernal pool fairly shrimp, etc. **Effects on Special-Status Species (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes protection of habitat that support these species.	
	Mirant Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).	
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to, preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).	
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.	
	South Bay Desalination - Irrigation Use	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special-status species to a large extent. Any effects to special-status species would likely be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).	
	South Bay Desalination - Potable Use		
	Water Recycling	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).	

1. Location and size of facilities and details of operation will be developed in later phases of the RDP and will not be incorporated into the current BAWQ&SRP.

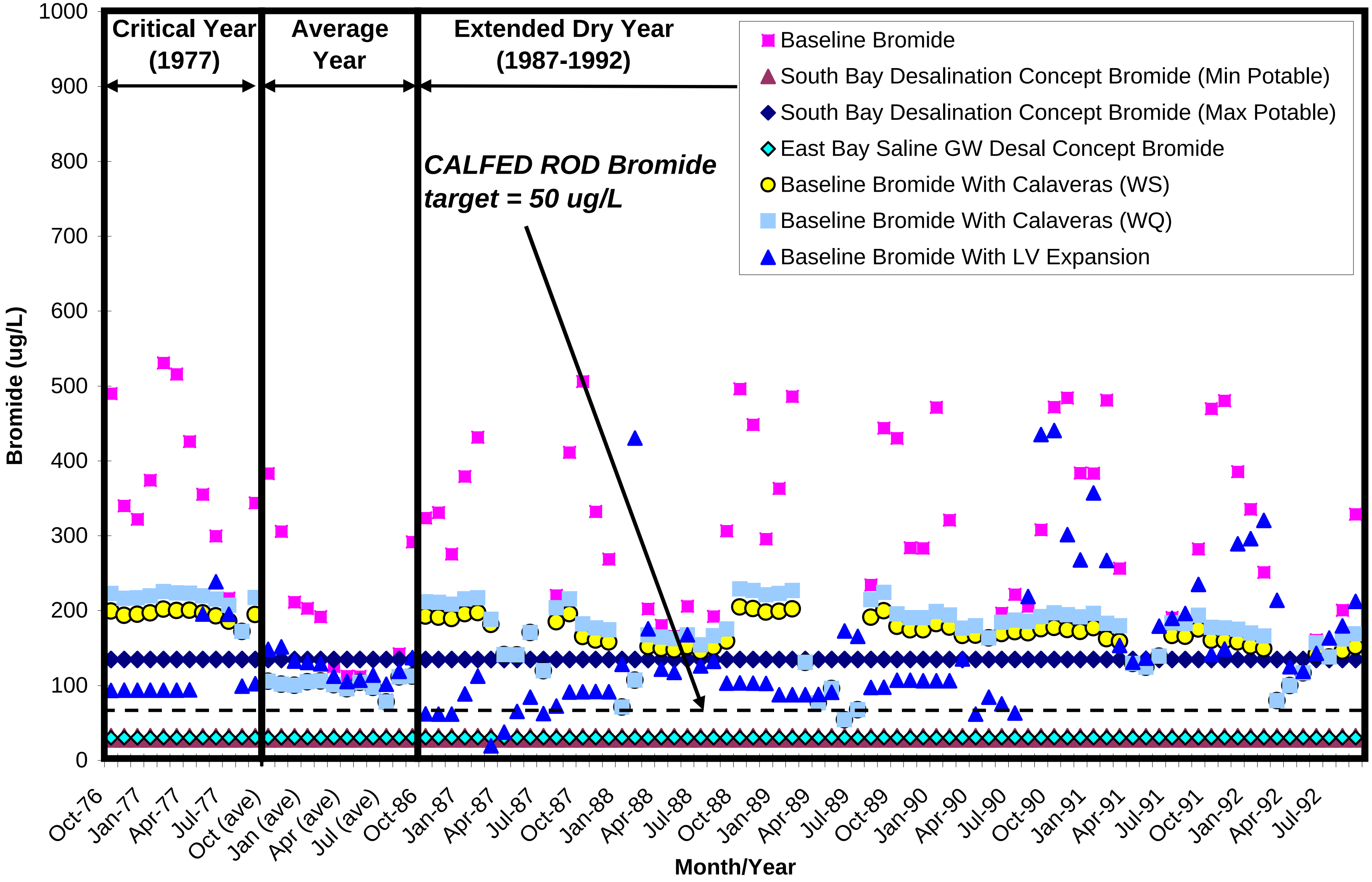
Table G21-4 - Environmental Score Card (Page 5 of 5)

Performance	Concept	Concept Rating	Notes
Energy Consumption			
Potential Increases in Energy Consumption (amount of energy required for facility operation) Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD^1**. The energy requirement associated with concept operation is not known. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD^1.** More information would be required to identify potential effects and mitigation opportunities.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant and related facilities. As Hetch Hetchy hydropower (via the Newark Substation) would provide energy to operate concept facilities, no increase in pollutant emissions is anticipated. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD.** No increase in pollutant emissions is anticipated. Mitigation opportunities have not been identified to reduce the increase in energy usage.	
	Los Vaqueros Reservoir Expansion	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** The proposed concept would consume 183 million kwh of energy. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants.	
	Mirant Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD^1.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD^1.** Further evaluation would be required to determine the level of impact and mitigation opportunities.	
	Near Bay Bridge Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD^1.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD^1.** Further evaluation would be required to determine the level of impact and mitigation opportunities.	
	Regional Desalination Project	TBD^2 - Will depend on specific sites, sizes and operations.	
	South Bay Desalination - Irrigation Use	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Generally, energy requirements would be 3,250 kwh/mg of water (CDM, 2004). The energy demand of an individual desal facility is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.	

1. To be determined in future studies.
2. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Example Portfolio: Maximize Supply Reliability with Storage

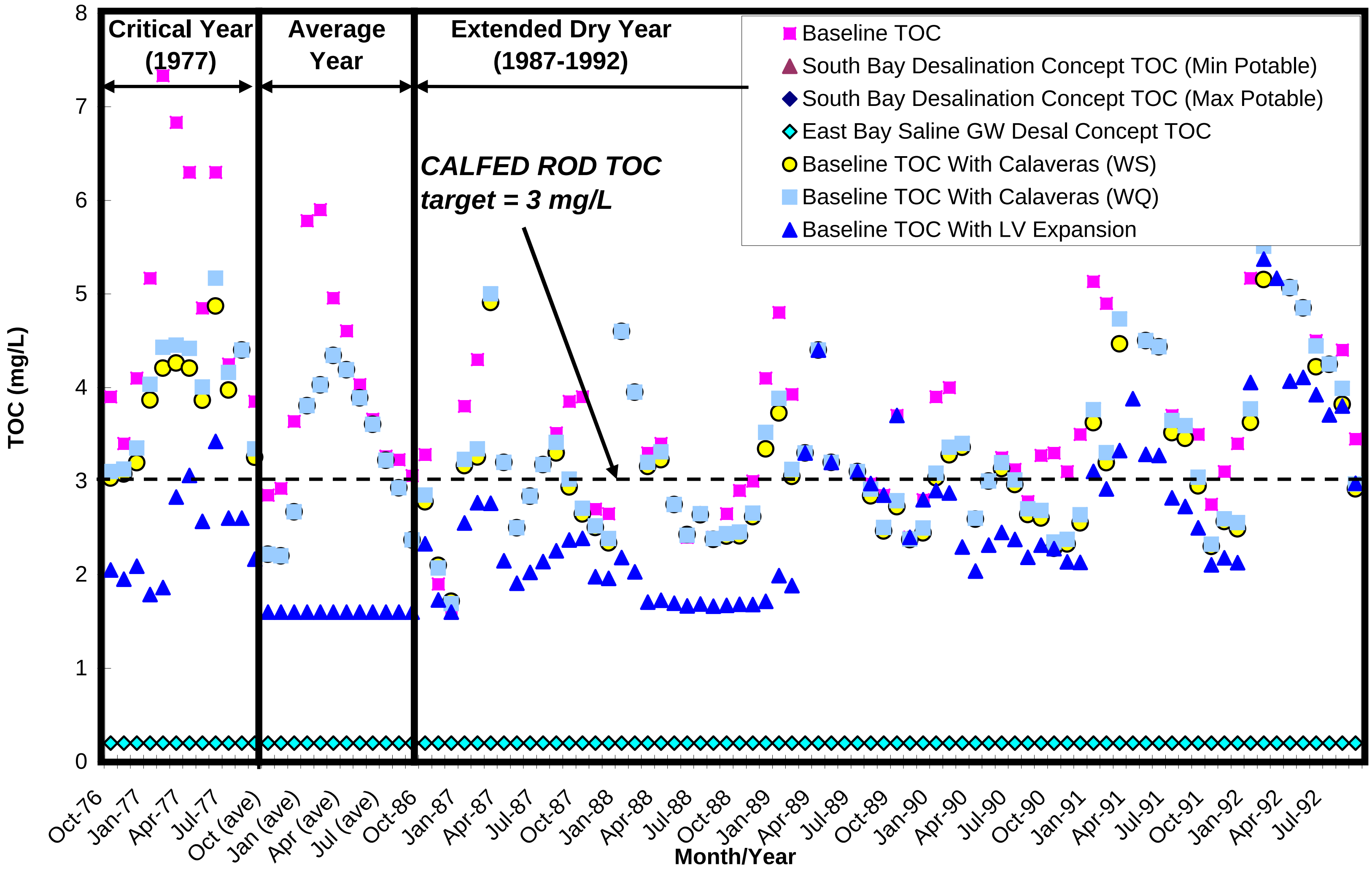
Comparison of SCVWD Source Water Bromide with Concept Bromide



Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline bromide with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

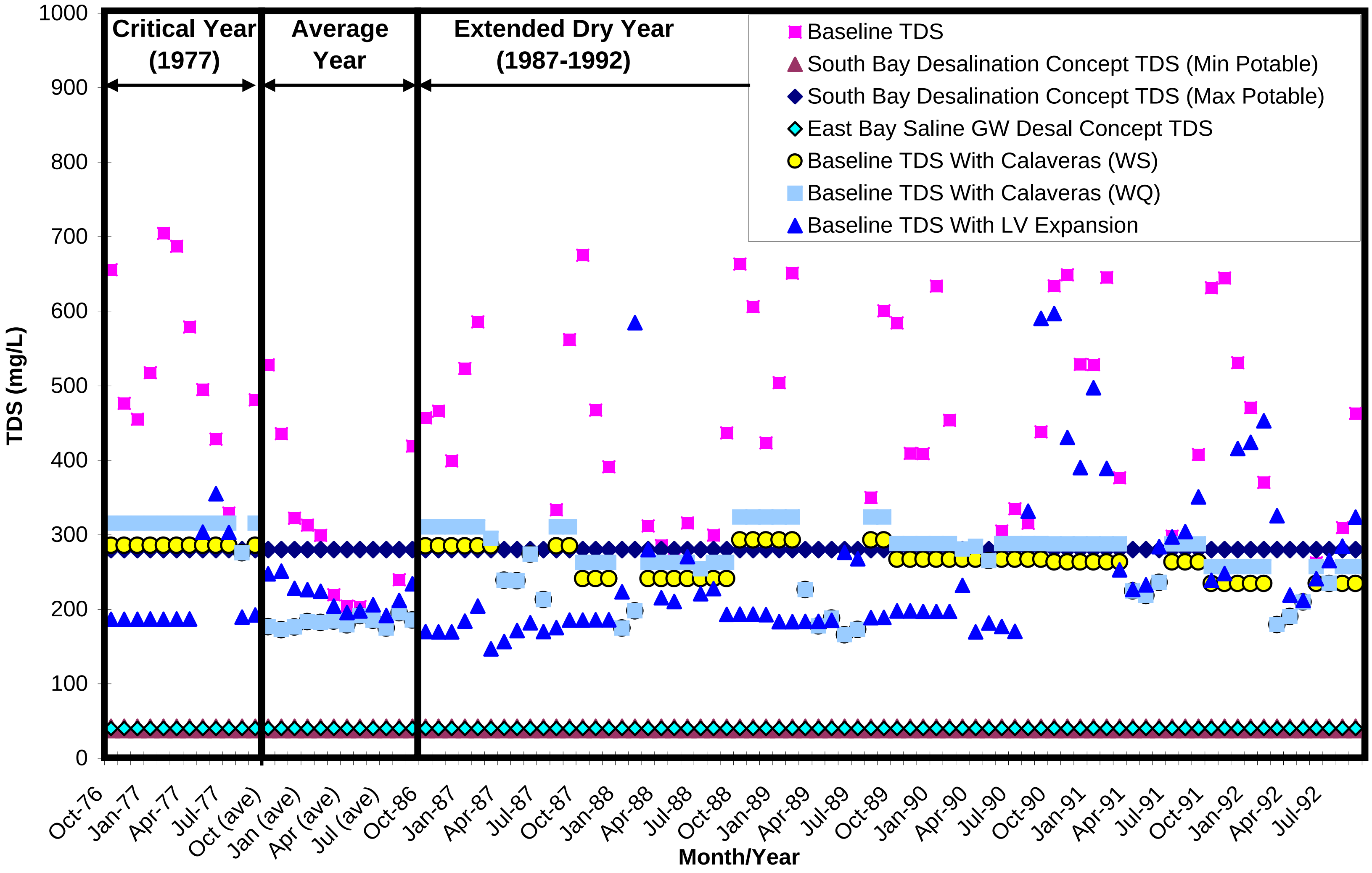
Comparison of SCVWD Source Water TOC with Concept TOC



Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TOC with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

Example Portfolio: Maximize Supply Reliability with Storage

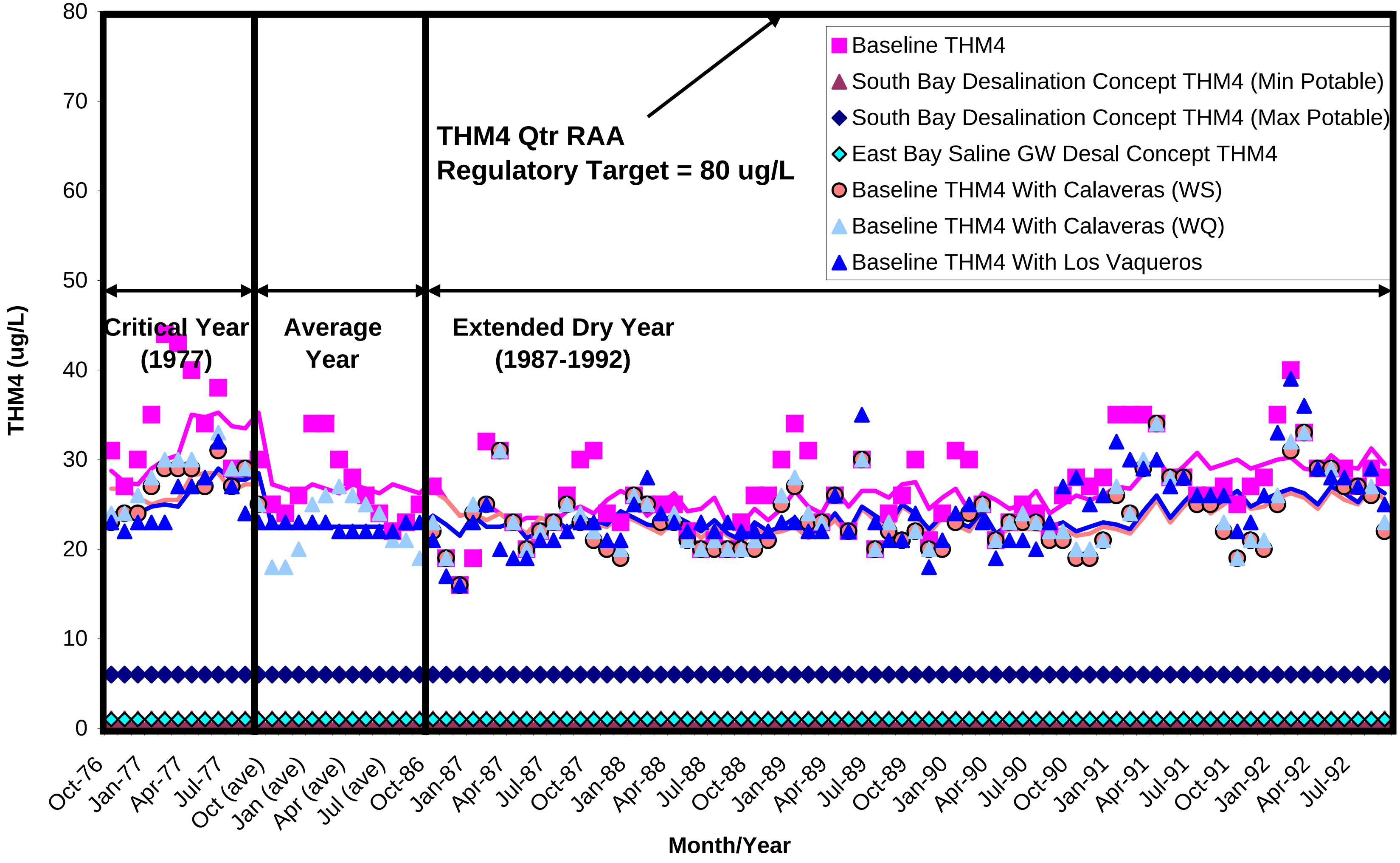
Comparison of SCVWD Source Water TDS with Concept TDS



Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SCVWD supplies in the distribution system. The baseline TDS with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA source water quality with the reservoir expansions.

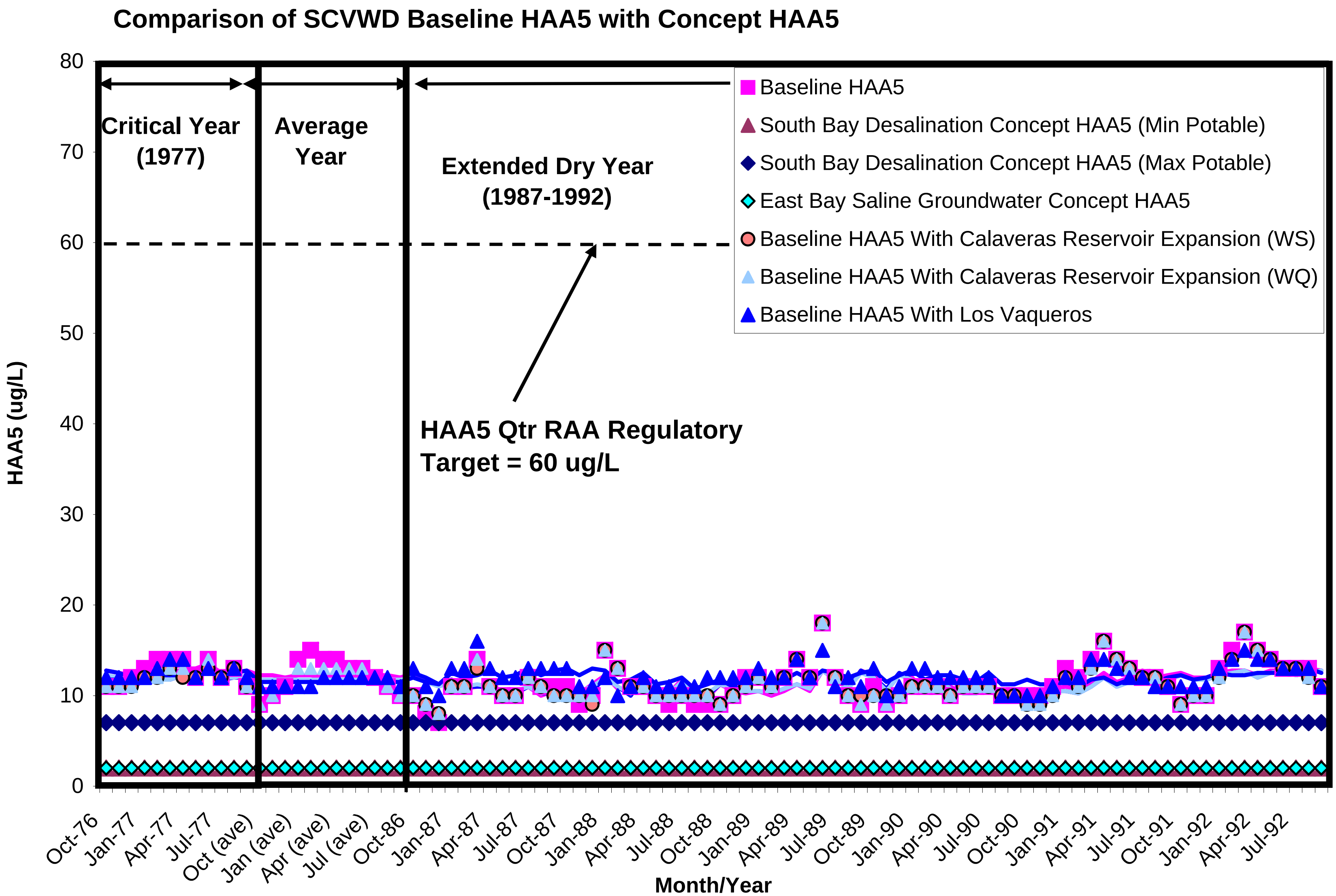
Example Portfolio: Maximize Supply Reliability with Storage

Comparison of SCVWD Baseline THM4 with Concept THM4



Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. The baseline THM4 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production assumes settled water ozonation.

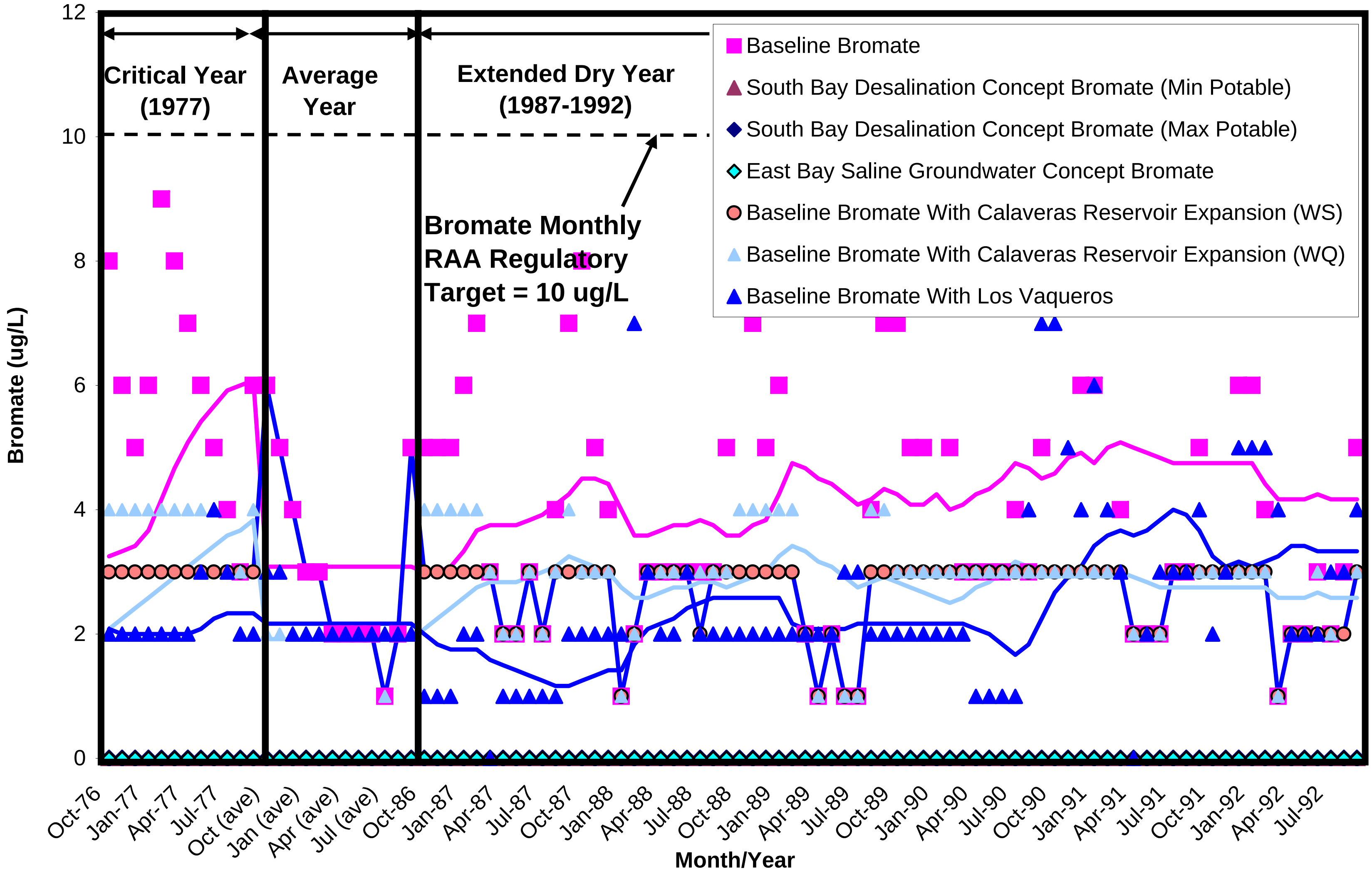
Example Portfolio: Maximize Supply Reliability with Storage



Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. Baseline HAA5 with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production assumes settled water ozonation.

Example Portfolio: Maximize Supply Reliability with Storage

Comparison of SCVWD Baseline Bromate with Concept Bromate



Note: Concept bromate reflects bromate in each pure desalinated supply. These would be blended with SCVWD supplies in the distribution system. Baseline bromate with Calaveras and Los Vaqueros Reservoir Expansions is the projected blended SBA treated water quality with the reservoir expansions. Simulated baseline DBP production assumes settled ozonation.

G22 SFPUC Concepts

G22 San Francisco Public Utilities Commission: All Concepts

DESCRIPTION

San Francisco Public Utilities Commission (SFPUC) is a potential beneficiary for the following concepts:

- Los Vaqueros Reservoir Expansion
- Calaveras Reservoir Expansion
- Regional Desalination Project
- East Bay Saline Groundwater Desalination
- South Bay Desalination (Potable or Irrigation)
- Enhanced Conservation
- Recycled Water Concepts

The attached scorecard summarizes information for three of these five concepts. The Los Vaqueros Reservoir Expansion concept is not included in the scorecard because details of SFPUC participation in this concept will be developed as part of future studies. Enhanced conservation is not included on the scorecard because no specific conservation thresholds have been established.

SFPUC Concepts Summary

Los Vaqueros Reservoir Expansion	
Average Year Water Quality	TBD in future studies
Dry Year Water Quality	TBD in future studies
Calaveras Reservoir Expansion	
Average Year Water Quality	0 AFY
Dry Year Supply Reliability	41,000 to 53,000 AFY
Regional Desalination Project	
Average Year Water Quality	TBD in future studies
Dry Year Supply Reliability	TBD in future studies
East Bay Saline Groundwater Desalination	
Average Year Water Quality	Up to 16,000 AFY
Dry Year Supply Reliability	Up to 16,000 AFY
South Bay Desalination (Potable or Irrigation)	
Potable Average Year Water Quality	0 AFY
Potable Dry-Year Supply Reliability	Up to 13,800 AFY
Enhanced Conservation	
Supply, All Years	TBD in future studies
Recycled Water Concepts	
Supply, All Years	Up to 54,300 AFY

Each of the concepts and the potential benefits are summarized below.

☐ *Los Vaqueros Reservoir Expansion*

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability (BAWQ&SR) Program, the multipurpose operating scenario for a 500,000 AF reservoir, with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the BAWQ&SR Program as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are Contra Costa Water District (CCWD), Alameda County Water District (ACWD), Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

☐ *Calaveras Reservoir Expansion*

The Calaveras Reservoir Expansion could potentially involve an increase in capacity from the existing size of 97,000 AF up to 420,000 AF. An SFPUC study is currently looking at alternatives for replacement of the dam, including: replacement at the existing capacity of 97,000 AF, and initial construction at 97,000 AF, with the ability to expand in the future up to 420,000 AF. The BAWQ&SR Program is evaluating potential facilities that would be required and operating scenarios that could be implemented if the reservoir were expanded to 420,000 AF. These scenarios and facilities are presented for illustrative purposes only.

Two operational scenarios are being considered for the Calaveras Reservoir expansion: 1) a water quality and dry-year supply reliability operational scenario, where up to 50,000 AFY would be delivered to South Bay Aqueduct (SBA) contractors ACWD and SCVWD during average years, via a new connection to the SBA, and up to 41,000 AFY could be delivered to SFPUC (retail and wholesale customers), ACWD and SCVWD in dry years; and 2) a dry-year supply reliability scenario in which SFPUC (retail and wholesale customers), ACWD and SCVWD would potentially receive up to 53,000 AFY.

☐ *Regional Desalination Project*

The Bay Area Regional Desalination Project (RDP) is intended to improve supply reliability for customers served by partner agencies by developing a desalination plant, or plants, at a site, or sites, which will provide benefit, either directly or indirectly, to each of the agencies that choose to participate. Regional partners sponsoring the RDP are CCWD, East Bay Municipal Utility District (EBMUD), SFPUC and SCVWD. The RDP could potentially provide an additional source of water during emergencies, provide supplemental supply during extended drought periods, allow increased flexibility in taking other facilities offline for repairs, or provide a full-time, all weather supplemental supply, increasing the diversity of supplies for the partner agencies. The RDP is evaluating providing up to 120 million gallons per day (MGD) product water at one or multiple sites. All partners are intended to benefit from the facility, either through receiving desalinated water directly, or by receiving water from another agency that receives desalinated water. Supply quantities and allocations will be determined as part of the RDP, and are not included in this analysis.

☐ *East Bay Saline Groundwater Desalination Project*

The East Bay Saline Groundwater Desalination Facility would involve location of a 10 to 15 MGD (treated production capacity) desalination plant in Newark or Fremont, California, for the purpose of desalinating non-potable, saline water from the saline portion of the Newark Aquifer. Water would be extracted through a series of bay-shore perimeter wells within ACWD's service district area. Finished water could be pumped directly into ACWD's distribution system or into SFPUC's Bay Division Pipelines 1& 2 in its regional transmission system. Concentrate discharge could potentially be disposed of by delivering it to the East Bay Discharge Authority (EBDA) discharge pipeline, several miles north of the project area, or other options to be identified and evaluated during project planning. This concept has a potential dry-year supply reliability and average year water quality benefit of up to 16,000 AFY. Potential beneficiaries are ACWD (dry-year supply and average year water quality), SFPUC (dry-year supply only for retail and wholesale customers), and SCVWD (details to be developed in future studies), and SCVWD (details to be developed in future studies).

☐ *South Bay Desalination Concept (Potable or Irrigation Supply)*

The South Bay Desalination concept could involve construction of up to three desalination plants in Santa Clara County treating brackish groundwater extracted from the upper aquifer. The upper aquifer is currently only used for small local domestic or agricultural purposes, or for chemical contamination remediation projects. Three potential sites have been identified: Pico Power Plant in Santa Clara, Los Esteros Power Plant in San Jose, and the Palo Alto Regional Water Quality Control plant (WQCP) in Palo Alto. Each of these plants is assumed to have an intake capacity of up to 5 MGD. The end use for the desalinated supply could be for non-potable irrigation and industrial use, or for potable use. Two different target supply and water quality ranges have been selected, corresponding to the alternatives for end use. The intake capacity of 5 MGD is assumed for potable supply. However, due to recycled water supplies available for irrigation and industrial uses, demand for these purposes is lower, and production capacity is assumed to be 1 MGD per plant.

Potable supply projects at all three sites would have a potential dry-year supply benefit of up to 13,800 AFY and an average year water quality benefit of up to 8,300 AFY. Water quality benefits were only assumed for concepts that could potentially offset SCVWD surface water or groundwater. Irrigation supply projects at all three sites would have a potential supply benefit of 3,200 AFY in all years.

☐ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SR Program. These recycled water projects will provide up to 93,800 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

SFPUC is a potential beneficiary for eleven recycled water concepts with a total yield of 54,300 AFY

- ACWD-USD Recycled Water Feasibility Study Project (1,700 AFY)
- Burlingame Recycled Water Project (4,400 AFY)
- Expanded South Bay Water Recycling Program (16,800 AFY)
- Millbrae Recycled Water Project (1,100 AFY)
- North Coast County Water District/Pacifica Recycled Water Project (200 AFY)
- Palo Alto Recycled Water Project (1,800 AFY to 4,700 AFY)
- Palo Alto Regional Water Quality Control Plant/Mountain View Recycled Water Project (1,500 AFY to 1,900 AFY)
- Redwood City/South Bayside System Authority Recycled Water Project (1,960 AFY)
- San Francisco Recycled Water Project (up to 19,000 AFY)
- Stanford University Recycled Water Project (100 AFY to 1,100 AFY)
- Sunnyvale Recycled Water Project (1,500 AFY)

Table G22-1 - Supply Reliability Score Card

Concept or Example Portfolio	Agency Baseline		Concept		Agency Baseline Plus Concept		Notes/Other
	Amount or Description	Units	Amount or Description	Units	Amount or Description	Units	
Meet Demand							
Critical Drought							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	The Calaveras Expansion - Water Supply reports results for maximize water supply operation of a 420,000 AF expanded reservoir, for 53,000 AFY yield delivered in dry years either to the SFPUC retail and wholesale system, or to ACWD and SCVWD through interconnections with the SFPUC system and/or directly into the SBA downstream of Zone 7. The Calaveras Expansion - Water Quality reports results for maximize water quality operation of a 420,000 AF expanded reservoir, for 41,000 AFY dry-year yield and 50,000 AFY delivered in average or wet years either through interconnections with the SFPUC system, or directly into the SBA downstream of Zone 7. No attempt has been made to allocate supplies. This would need to be evaluated as part of future studies. For the East Bay Desal, water would be extracted through a series of bay shore perimeter wells within ACWD's service district area. Finished water could be pumped into the Bay Division pipeline of San Francisco's Hetch Hetchy system. SFPUC's participation in the Mirant and Near Bay Bridge Desals will be determined as part of the Regional Desalination Project. These concepts, which are a variation on the RDP (and is not being evaluated in the RDP), evaluate only the specific sites. Specific plant locations and amounts for the RDP are to be determined as part of RDP. For the South Bay Desal project, projected desalinated supplies have not been partitioned to potential beneficiaries as part of this project. Recipients include the City of Palo Alto, the City of Santa Clara, and the San Jose Municipal System.
Calaveras Reservoir Expansion - Water Supply	157,000	AFY	Up to 53,000	AFY	Up to 210,000	AFY	
Calaveras Reservoir Expansion - Water Quality	157,000	AFY	Up to 41,000	AFY	Up to 198,000	AFY	
East Bay Saline Groundwater Desalination	157,000	AFY	Up to 16,000	AFY	Up to 173,000	AFY	
Los Vaqueros Reservoir Expansion	157,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
Mirant Desalination with Water Quality Element	157,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element	157,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	157,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	157,000	AFY	Up to 3,200	AFY	Up to 160,200	AFY	
South Bay Desalination - Potable Use	157,000	AFY	Up to 13,800	AFY	Up to 170,800	AFY	
Water Recycling	157,000	AFY	Up to 54,256	AFY	157,000	AFY	
Extended Drought							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	255,000	AFY	Up to 53,000	AFY	Up to 308,000	AFY	
Calaveras Reservoir Expansion - Water Quality	255,000	AFY	Up to 41,000	AFY	Up to 296,000	AFY	
East Bay Saline Groundwater Desalination	255,000	AFY	Up to 16,000	AFY	Up to 271,000	AFY	
Los Vaqueros Reservoir Expansion	255,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
Mirant Desalination with Water Quality Element	255,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
Near Bay Bridge Desalination with Water Quality Element	255,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
Regional Desalination Project	255,000	AFY	TBD[2]	AFY	TBD[2]	AFY	
South Bay Desalination - Irrigation Use	255,000	AFY	Up to 3,200	AFY	Up to 258,200	AFY	
South Bay Desalination - Potable Use	255,000	AFY	Up to 13,800	AFY	Up to 268,800	AFY	
Water Recycling	255,000	AFY	Up to 54,256	AFY	255,000	AFY	
Average Year							
Bay Area Use of the Freeport Regional Water Project	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Supply	329,000	AFY	0	AFY	329,000	AFY	
Calaveras Reservoir Expansion - Water Quality	329,000	AFY	0	AFY	329,000	AFY	
East Bay Saline Groundwater Desalination	329,000	AFY	0	AFY	329,000	AFY	
Los Vaqueros Reservoir Expansion	329,000	AFY	TBD[1]	AFY	TBD[1]	AFY	
Mirant Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Near Bay Bridge Desalination with Water Quality Element	N/A	AFY	N/A	AFY	N/A	AFY	
Regional Desalination Project	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Irrigation Use	329,000	AFY	Up to 3,200	AFY	329,000	AFY	
South Bay Desalination - Potable Use	329,000	AFY	0	AFY	329,000	AFY	
Water Recycling	329,000	AFY	Up to 54,256	AFY	329,000	AFY	
Vulnerability							
Bay Area Use of the Freeport Regional Water Project	Distribution system vulnerable to seismic events on Hayward or Calaveras faults. Vulnerable to loss of Hetch Hetchy Aqueduct, since local supply can only be served to retail customers.		N/A				
Calaveras Reservoir Expansion - Water Supply			Reduces Vulnerability - Provides additional supply flexibility for maintenance outages or water quality events in Hetch Hetchy Aqueduct supply. Reduces vulnerability to sesmic events on Calaveras fault.				
Calaveras Reservoir Expansion - Water Quality			Reduces Vulnerability - Provides additional supply flexibility for maintenance outages or water quality events in Hetch Hetchy Aqueduct supply. Reduces vulnerability to sesmic events on Calaveras fault.				
East Bay Saline Groundwater Desalination			Reduces Vulnerability - Provides alternate source of supply if Irvington Tunnel were interrupted. Located West of Hayward fault, reducing vulnerability to earthquakes.				
Los Vaqueros Reservoir Expansion			N/A				
Mirant Desalination with Water Quality Element			TBD[2]				
Near Bay Bridge Desalination with Water Quality Element			TBD[2]				
Regional Desalination Project			TBD[2]				
South Bay Desalination - Irrigation Use			No Effect on Vulnerability - This concept provides nonpotable supply and will not affect the vulnerability of the SFPUC potable system.				
South Bay Desalination - Potable Use			Reduces Vulnerability - Could provide small supply source to SFPUC/SCVWD common customers in the event of a supply disruption on the Hetch Hetchy Aqueduct, but only a small fraction of SFPUC customers could be served.				
Water Recycling			No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems of potential participating agencies.				
Self-Sufficiency within the Region							
Bay Area Use of the Freeport Regional Water Project	N/A						
Calaveras Reservoir Expansion - Water Supply	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
Calaveras Reservoir Expansion - Water Quality	Increases Self-Sufficiency within the Region - The project would be locally controlled.						
East Bay Saline Groundwater Desalination	Increases Self-Sufficiency within the Region - Project would be locally controlled.						
Los Vaqueros Reservoir Expansion	TBD[1]						
Mirant Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would control the water quality element of the concept locally.						
Near Bay Bridge Desalination with Water Quality Element							
Regional Desalination Project							
South Bay Desalination - Irrigation Use	Increases Self-Sufficiency within Region - Project would be locally controlled.						
South Bay Desalination - Potable Use							
Water Recycling	Increases Self-Sufficiency within Region - Concepts will be owned, operated, and controlled locally.						

1. Details of potential SFPUC participation in the Los Vaqueros Reservoir Expansion will be developed in future studies.

2. Concept supply quantities, partitioning between partners, and potential benefits and/or impacts associated with the RDP will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-2 - Public Health Protection Scorecard (Page 1 of 2)

	Concept		**Agency Baseline Plus Concept**		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus SFPUC Source Water**	**Concept Plus SFPUC Treated Water**	**Notes**
Variability for Treatment					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	Variability for Treatment	NA	Minimal change in source water quality
Calaveras Reservoir Expansion - Water Quality	NA	NA	Variability for Treatment	NA	Expansion will have a minimal effect on source water quality
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	No effect on untreated water quality of current plants
Los Vaqueros Reservoir Expansion	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
South Bay Desalination - Potable Use	NA	NA	NA	NA	Disinfection will occur at the desalination facility. Desalination for irrigation/industrial use will have no impact on source water for treatment.
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Total Dissolved Solids					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	No Effect on TDS	NA	Minimal change in source water TDS
Calaveras Reservoir Expansion - Water Quality	NA	NA	No Effect on TDS	NA	Expansion will have a minimal effect on source water TDS
East Bay Saline Groundwater Desalination	Increases TDS	Increases TDS	NA	NA	Minimal increase in TDS[2]
Los Vaqueros Reservoir Expansion	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will be substantially higher in TDS (up to 500 mg/L) than potable supplies, but will have no effect on potable water quality.
South Bay Desalination - Potable Use	NA	No Effect on TDS	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS.
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Disinfection By-Products					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	No Effect on DBPs	Minimal change in delivered water quality
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	No Effect on DBPs	Expansion will have a minimal effect on treated water DBP production
East Bay Saline Groundwater Desalination	Reduces DBPs	Reduces DBPs	NA	NA	Desalinated DBPs lower than baseline
Los Vaqueros Reservoir Expansion	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will likely be lower in DBPs than potable supplies, due to lower chlorine demand from RO treatment, but will have no effect on potable water quality.
South Bay Desalination - Potable Use	NA	Reduces DBPs	NA	NA	Desalinated supplies for potable use will be significantly lower in DBPs than usual supplies, due to lower chlorine demand.
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.

1. Details of potential SFPUC participation in the Los Vaqueros Reservoir Expansion to be developed in future studies.
2. Location of facilities and specific benefits to agencies will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-2 - Public Health Protection Scorecard (Page 2 of 2)

	Concept		**Baseline Plus Concept**		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus SFPUC Source Water**	**Concept Plus SFPUC Treated Water**	**Notes**
Taste and Odor Problems (Excluding TDS)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	No effect on T&O	Minimal change in delivered water quality
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	No Effect on T&O	Expansion is not expected to significantly affect taste and odor
East Bay Saline Groundwater Desalination	No Effect on T&O	No Effect on T&O	NA	NA	Not projected to affect taste and odor
Los Vaqueros Reservoir Expansion	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	Desalinated supplies for irrigation and/or industrial use will not be potable.
South Bay Desalination - Potable Use	NA	No Effect on T&O	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Desalinated supplies will have significantly lower TOC than usual supplies, but hig
Water Recycling	NA	NA	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Calaveras Reservoir Expansion - Water Quality	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
East Bay Saline Groundwater Desalination	NA	NA	No Effect on Potential for Degradation	NA	East Bay Saline Groundwater Desalination treated water quality is comparable to SFPUC water quality (improved quality compared to SBA source).
Los Vaqueros Reservoir Expansion	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	Increases Potential for Degradation	Increases Potential for Degradation	NA	NA	Increased TDS in desalinated supplies displacing potable supplies used for the same purpose could have effects on the groundwater salt balance.
South Bay Desalination - Potable Use	NA	No Effect on Potential for Degradation	NA	NA	Desalinated supplies for potable use will be treated to match or improve upon existing TDS. Two targets were used to develop ranges, based on SCVWD and Hetch Hetchy TDS. Bromide levels will be well below SCVWD averages, and a significant reduction in TO
Water Recycling	N/A	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
Calaveras Reservoir Expansion - Water Quality	NA	NA	Increases Potential for Degradation	Increases Potential for Degradation	The potential for algal biotoxins may increase with the increased chance of algal blooms in an expanded reservoir.
East Bay Saline Groundwater Desalination	NA	NA	No Effect on Potential for Degradation	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
Los Vaqueros Reservoir Expansion	TBD[1]	TBD[1]	TBD[1]	TBD[1]	
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	
Regional Desalination Project	TBD[2] - Specific benefits to agencies will depend on location of facilities and allocations amongst agencies.				
South Bay Desalination - Irrigation Use	No Effect on Potential for Degradation	Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
South Bay Desalination - Potable Use	NA	Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated groundwater supplies.
Water Recycling	Increases Potential for Degradation	N/A	NA	NA	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with adva

1. Details of potential SFPUC participation in the Los Vaqueros Reservoir Expansion to be developed in future studies.
2. Location of facilities and specific benefits to agencies will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-2a - Public Health Protection Score Card by Agency

Concept: Calaveras Reservoir Expansion with Water Supply Element

			Agency Baseline		Concept		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**SFPUC Source Water**	**SFPUC Treated Water**	**SFPUC Source Water**	**SFPUC Treated Water**	**Calaveras Expansion plus Agency Baseline Source Water**	**Calaveras Expansion plus Agency Baseline Treated Water**	**Notes**
Supply Quantity									
Critical Year		AFY	157,000		NA		210,000		
Extended Dry Year		AFY	255,000		NA		308,000		
Average Year		AFY	329,000		NA		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	NA	0.01 - 0.03	0.01 - 0.01	
	Mean	mg/L	0.02	0.01	NA	NA	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	NA	1.4 - 3.1	1.4 - 2.7	
	Mean	mg/L	2.0	1.9	NA	NA	2.0	1.9	
pH	Qual		somewhat variable	less variable	NA	NA	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	less variable	less variable	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	NA	0.01 - 0.04	0.01 - 0.03	
	Mean	mg/L	0.02	0.01	NA	NA	0.02	0.01	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	NA	1.4 - 3.4	1.4 - 3.0	
	Mean	mg/L	2.0	1.9	NA	NA	1.9	1.8	
pH	Qual		somewhat variable	less variable	NA	NA	less variable	less variable	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	less variable	less variable	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	NA	NA	NA	
	Mean	mg/L	0.01	0.01	NA	NA	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	NA	NA	NA	
	Mean	mg/L	1.7	1.6	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	NA	NA	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	NA	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	NA	16 - 45	32 - 61	
	Mean	mg/L	26	26	NA	NA	31	47	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	NA	16 - 98	32 - 114	
	Mean	mg/L	42	42	NA	NA	39	55	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	NA	30 - 82	46 - 98	
	Mean	mg/L	40	40	NA	NA	52	68	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	NA	NA	ND	
THM4	Range	mg/L	NA	34 - 47	NA	NA	NA	30 - 39	
	Mean	mg/L	NA	38	NA	NA	NA	34	
HAA5	Range	mg/L	NA	28 - 40	NA	NA	NA	25 - 32	
	Mean	mg/L	NA	32	NA	NA	NA	29	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	NA	NA	ND	
THM4	Range	mg/L	NA	33 - 50	NA	NA	NA	30 - 43	
	Mean	mg/L	NA	38	NA	NA	NA	35	
HAA5	Range	mg/L	NA	24 - 44	NA	NA	NA	24 - 39	
	Mean	mg/L	NA	30	NA	NA	NA	28	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	NA	NA	ND - ND	
	Mean	mg/L	NA	ND	NA	NA	NA	ND	
THM4	Range	mg/L	NA	24 - 43	NA	NA	NA	24 - 44	
	Mean	mg/L	NA	33	NA	NA	NA	34	
HAA5	Range	mg/L	NA	22 - 34	NA	NA	NA	20 - 35	
	Mean	mg/L	NA	28	NA	NA	NA	27	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	No change	No change	Minimal change in water quality
Algal blooms	Qual		minimal	NA	NA	NA	minimal likelihood	NA	Potential reservoir mixing issues

Table G22-2b - Public Health Protection Score Card by Agency [1]

Concept: East Bay Saline Desal with Water Quality Element

			Agency Baseline		Concept		Baseline Plus Concept		
Performance Measure/Objective	Metric or Qual	Units	SFPUC Source Water	SFPUC Treated Water	East Bay Saline Groundwater Desal Source Water	East Bay Saline Groundwater Desal Treated Water	Agency Baseline Plus East Bay Saline Groundwater Source Water	Agency Baseline Plus East Bay Saline Groundwater Treated Water	Notes
Supply Quantity									
Critical Year		AFY	157,000		16,000		173,000		The concept provides up to 16,000 AFY of treated desalinated water (0 AFY of untreated source water) potentially injected into the BDPLs in dry years.
Extended Dry Year		AFY	255,000		16,000		271,000		
Average Year		AFY	329,000		0		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.02	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.1	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.02	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.02	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.1	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.02	NA	NA	
	Mean	mg/L	0.01	0.01	NA	0.02	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.1	NA	NA	
	Mean	mg/L	1.7	1.6	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40	NA	NA	
	Mean	mg/L	26	26	NA	40	NA	NA	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40	NA	NA	
	Mean	mg/L	42	42	NA	40	NA	NA	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40	NA	NA	
	Mean	mg/L	40	40	NA	40	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	34 - 47	NA	ND	NA	NA	
	Mean	mg/L	NA	38	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	28 - 40	NA	1	NA	NA	
	Mean	mg/L	NA	32	NA	1	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	33 - 50	NA	ND	NA	NA	
	Mean	mg/L	NA	38	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	24 - 44	NA	1	NA	NA	
	Mean	mg/L	NA	30	NA	1	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	24 - 43	NA	ND	NA	NA	
	Mean	mg/L	NA	33	NA	ND	NA	NA	
HAA5	Range	mg/L	NA	22 - 34	NA	1	NA	NA	
	Mean	mg/L	NA	28	NA	1	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. East Bay Saline Goundwater Desalination concept assumes target TDS of 40 mg/L.

SFPUC: Comparison of Concepts

Table G22-2c - Public Health Protection Score Card by Agency[1]

Concept: South Bay Desalination - Irrigation

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline		Concept		Baseline Plus Concept		Notes
			SFPUC Source Water	SFPUC Treated Water	South Bay Desalination - Irrigation and Industrial Use Source Water	South Bay Desalination - Irrigation and Industrial Use Treated Water	Agency Baseline Plus South Bay Desalination - Irrigation and Industrial Use Source Water	Agency Baseline Plus South Bay Desalination - Irrigation and Industrial Use Treated Water	
Supply Quantity									
Critical Year		AFY	157,000		3,200		160,200		
Extended Dry Year		AFY	255,000		3,200		258,200		
Average Year		AFY	329,000		3,200		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.17	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	2.0	1.9	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.17	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	2.0	1.9	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.13 - 0.22	NA	NA	
	Mean	mg/L	0.01	0.01	NA	0.17	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.9 - 1.5	NA	NA	
	Mean	mg/L	1.7	1.6	NA	1.2	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	290 - 500	NA	NA	
	Mean	mg/L	26	26	NA	395	NA	NA	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	290 - 500	NA	NA	
	Mean	mg/L	42	42	NA	395	NA	NA	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	290 - 500	NA	NA	
	Mean	mg/L	40	40	NA	395	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	34 - 47	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	38	NA	6	NA	NA	
HAA5	Range	mg/L	NA	28 - 40	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	32	NA	7	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	33 - 50	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	38	NA	6	NA	NA	
HAA5	Range	mg/L	NA	24 - 44	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	30	NA	7	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	ND - ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	24 - 43	NA	6 - 11	NA	NA	
	Mean	mg/L	NA	33	NA	6	NA	NA	
HAA5	Range	mg/L	NA	22 - 34	NA	7 - 11	NA	NA	
	Mean	mg/L	NA	28	NA	7	NA	NA	
Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. Two TDS targets were evaluated, 290 mg/L and 500 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Table G22-2d - Public Health Protection Score Card by Agency [1]

Concept: South Bay Desalination - Potable

Performance Measure/Objective	Metric or Qual	Units	Agency Baseline		Concept		Baseline Plus Concept		Notes
			SFPUC Source Water	SFPUC Treated Water	South Bay Desalination - Potable Use Source Water	South Bay Desalination - Potable Use Treated Water	Agency Baseline South Bay Desalination - Potable Use Source Water	Agency Baseline South Bay Desalination - Potable Use Treated Water	
Supply Quantity									
Critical Year		AFY	157,000		13,800		170,800		
Extended Dry Year		AFY	255,000		13,800		268,800		
Average Year		AFY	329,000		0		329,000		
Variability for Treatment									
Critical Year									
Bromide	Range	mg/L	0.01 - 0.03	0.01 - 0.02	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.08	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.2	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Extended Dry Year									
Bromide	Range	mg/L	0.01 - 0.04	0.01 - 0.03	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.02	0.01	NA	0.08	NA	NA	
TOC	Range	mg/L	1.4 - 3.4	1.4 - 3.0	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	2.0	1.9	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Average Year									
Bromide	Range	mg/L	0.01 - 0.02	0.01 - 0.01	NA	0.03 - 0.13	NA	NA	
	Mean	mg/L	0.01	0.01	NA	0.08	NA	NA	
TOC	Range	mg/L	1.3 - 1.9	1.3 - 1.9	NA	0.2 - 0.9	NA	NA	
	Mean	mg/L	1.7	1.6	NA	0.6	NA	NA	
pH	Qual		somewhat variable	less variable	NA	less variable	NA	NA	pH is somewhat variable prior to treatment but is buffered during treatment
Temperature	Qual		variable	less variable	NA	less variable	NA	NA	Temperature variations are seasonal
Total Dissolved Solids									
Critical Year	Range	mg/L	16 - 45	16 - 45	NA	40 - 280	NA	NA	
	Mean	mg/L	26	26	NA	160	NA	NA	
Extended Dry Year	Range	mg/L	16 - 109	16 - 109	NA	40 - 280	NA	NA	
	Mean	mg/L	42	42	NA	160	NA	NA	
Average Year	Range	mg/L	35 - 45	35 - 45	NA	40 - 280	NA	NA	
	Mean	mg/L	40	40	NA	160	NA	NA	
Disinfection Byproducts									
Critical Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	34 - 47	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	38	NA	1	NA	NA	
HAA5	Range	mg/L	NA	28 - 40	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	32	NA	2	NA	NA	
Extended Dry Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	33 - 50	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	38	NA	1	NA	NA	
HAA5	Range	mg/L	NA	24 - 44	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	30	NA	2	NA	NA	
Average Year									
Bromate	Range	mg/L	NA	ND	NA	ND	NA	NA	
	Mean	mg/L	NA	ND	NA	ND	NA	NA	
THM4	Range	mg/L	NA	24 - 43	NA	1 - 6	NA	NA	
	Mean	mg/L	NA	33	NA	1	NA	NA	
HAA5	Range	mg/L	NA	22 - 34	NA	2 - 7	NA	NA	
	Mean	mg/L	NA	28	NA	2	NA	NA	
Minimize Taste and Odor									
Source of water	Qual		NA	NA	NA	NA	NA	NA	This concept will not affect SCVWD, BAWSCA, or SFPUC source water.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	

1. Two TDS targets were evaluated, 40 mg/L and 280 mg/L. Ranges show average water quality for lower target - average water quality for higher target. Average shows average water quality for the two targets.

Table G22-3 - Cost, Environmental and Implementation Score Card (Page 1 of 5)

Performance Measure/Objective	Concept	Concept	Amount or Rating	Notes/Other
Cost Impacts				
Cost Impacts	Bay Area Use of the Freeport Regional Water Project	Capital Cost	NA	
		Operating & Maintenance Cost	NA	
		Environmental Mitigation Cost	NA	
		Lifecycle Cost	NA	
		Allocation of Costs	NA	
	Calaveras Reservoir Expansion - Water Supply	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing st
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Calaveras Reservoir Expansion - Water Quality	Capital Cost	$426M ($2003)	Capital costs include new dam, spillway, outlet works (Contingency Action Plan for Calaveras Dam Evaluations, URS, 01/2003), pipelines from reservoir to SVWTP, from SVWTP to pump station and from Calaveras to SBA, pump station, power, pressure reducing st
		Operating & Maintenance Cost	$3.5 M/Yr ($2003)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	East Bay Saline Groundwater Desalination	Capital Cost	TBD[1]	Capital costs associated with the desalination on-site facilities are projected to be $75 million ($2005). Capital costs of ancillary facilities and conveyance, operating and life-cycle costs to be determined as part of future studies.
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Los Vaqueros Reservoir Expansion	Capital Cost	$1500M (2008 $)	Cost estimates from CALFED Los Vaqueros Expansion Studies (CALFED, 2004). Annual costs and potential cost-sharing options will be evaluated in future phases of the CALFED Los Vaqueros Reservoir Expansion studies.
		Operating & Maintenance Cost	$27.5M (2008 $)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Mirant Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Near Bay Bridge Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider capital, operating and potential buy-in/wheeling fees. Life-cycle costs for the capital element only are $2.5M/year. Unit costs for capital cost portion only are $280/AF/yr, assuming deliveries to Z7 in 60% of all years (based on drought-frequency from CALFED Common Assumptions studies).
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	NA	
	Regional Desalination Project	Capital Cost	TBD[1]	Specific capital costs, operating costs and lifecycle costs will depend on location and operation of facilities. The Regional Desalination Project Phase 1 report included capital costs ($2003) ranging from $168M to $285M for a 40-MGD plant at each of the three sites considered, and $466M for a 120-MGD facility at the Mirant site. O&M costs ($2003) were estimated at $17M to $38M per year for a 40-MGD plant at each of the sites considered, and $51M per year for a 120-MGD facility at the Mirant site.
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	South Bay Desalination - Irrigation Use	Capital Cost	$14 - $17 M	Conceptual-level capital costs are estimated at $14 - 17M, depending on finished water quality. Operational costs estimated a $2.6 M/year. Lifecycle costs are projected to be approximately $3.6 - $3.8 M/year. Unit costs are $1,100/AF.
		Operating & Maintenance Cost	$2.6 M/Year	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	$3.6 - $3.8 M	
		Allocation of Costs	N/A	
	South Bay Desalination - Potable Use	Capital Cost	$41 - $138 M	Conceptual-level capital costs are estimated at $41 - 138M, depending on finished water quality. Operational costs estimated at $8.8 - $9.5 M/year. Lifecycle costs are projected to be approximately $12.4 - $18.8 M/year. Unit costs are $860 - $1,390/AF
		Operating & Maintenance Cost	$8.8 - $9.5 M/Yr	
		Environmental Mitigation Cost	Included in capital cost	
		Lifecycle Cost	$12.4 - $18.8 M/Yr	
		Allocation of Costs	N/A	
	Water Recycling	Capital Cost	Up to $492 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
		Operating & Maintenance Cost	Up to $11.4 M/Yr	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	Up to $47 M/Yr	
		Allocation of Costs	Up to $1,533/AF	

1. To be determined in future studies.

Table G22-3 - Cost, Environmental and Implementation Score Card (Page 2 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Impacts to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Overall Impacts to the Environment (Before Mitigation): High Impact.**Potential effects are primarily associated with aquatic and terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land and water resources. In addition, other facility development could also affect sensitive biological resources. **Overall Impacts to the Environment (After Mitigation): No Impact.**Mitigation opportunities include restoration and enhancement efforts in and around the watershed at a 3:1 ratio o at a ratio that is deemed appropriate by regulatory agencies.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Overall Impacts to the Environment (Before Mitigation): Low Impact.**Construction and operation of the concept facilities would primarily consist of temporary, construction-related effects. **Overall Impacts to the Environment (After Mitigation): No Impact.**Mitigation opportunities to reduce construction and operation impacts include alternative siting of facilities to avoid sensitive resources to the extent feasible, preconstruction surveys (e.g., for special-status species), implementation of site-specific measures (e.g., monitoring during construction, use of exclusionary fencing, restoration), restriction on construction schedule (e.g., during breeding / nesting season of certain bird species if their nests are found nearby), etc. These mitigation measures would ensure that short-term effects are reduced.	
	Los Vaqueros Reservoir Expansion	**Overall Impacts to the Environment (Before Mitigation): Low Impact.**Potential effects are primarily associated with terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land. However, design of the facility would benefit aquatic resources, thus offsetting impacts to terrestrial resources. **Overall Impacts to the Environment (After Mitigation):No Impact.** Mitigation opportunities include restoration and enhancement efforts on existing watershed lands and lands owned by potential partner agencies or open space managers. In addition, acquisition of additional land for protection, restoration, and/or enhancement would occur. Mitigation acreage would range from 1,953 to 8,576 acres. Effects on recreation would be offset by the restoration and augmentation of trails (increase in 17 miles of trails).	
	Mirant Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.**Construction and operation of intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.**Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.**Construction and operation of the intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.**Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Regional Desalination Project	TBD[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	**Overall Impacts to the Environment (Before Mitigation): Low Impact.**Construction and operation of the concept facilities would primarily consist of temporary construction-related effects. Siting of facilities (e.g., groundwater wells) may result in direct effects to sensitive resources depending on the location. No long-term operational effects are expected if brine discharge complies with existing NPDES permit. **Overall Impacts to the Environment (After Mitigation): No Impact.**Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.**Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are exoected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.**Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-3 - Cost, Environmental and Implementation Score Card (Page 3 of 5)

Performance Measure/Objective	**Concept**	**Amount or Rating**	**Notes/Other**
Environmental Impacts[1]			
Overall Benefits to Environment	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	**Overall Benefits to the Environment (Before Mitigation): Low Benefits**. If the Maximize Water Quality option of this concept is selected, the concept has the potential to reduce Delta fisheries impacts, as it would reduce pumping during the normal and wet years. **Overall Benefits to the Environment (After Mitigation): High Benefits.** Protection, restoration, and enhancement of habitat for plants and wildlife species would be considered a benefit since the acreage protected, restored, or enhanced would likely exceed that affected by concept implementation.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Implementation of this concept would slightly reduce pumping from the Delta, and thus would be considered an environmental benefit to Delta resources. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would unlikely result in additional benefits to the environment.	
	Los Vaqueros Reservoir Expansion	**Overall Benefits to the Environment (Before Mitigation): High Benefits**. Potential benefits associated with the proposed concept include the following: - Installation of state-of-the-art fish screens for diversions to the SBA, - Flexibility to shift the timing and location of water diversions to protect fish, - System flexibility to store and move water (including for environmental water storage); also, provision of additional storage (for natural disasters, toxic spills, or levee failures in the Delta). **Overall Benefits to the Environment (After Mitigation): High Benefits**. Benefits would then be associated with increased protected and restored land as well as additional recreation opportunities (see mitigation opportunities above).	
	Mirant Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Regional Desalination Project	TBD[2] - Overall impacts and benefits will depend on specific sites selected in Regional Study	
	South Bay Desalination - Irrigation Use	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source (Santa Clara – Pico Power Plant Site only) to offset SCVWD during normal years reduces spring and summer pumping from the Delta, there would be a benefit to the Delta. Incremental benefits to the environment from implementation of the concept at the other sites are not expected. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	South Bay Desalination - Potable Use		
	Water Recycling	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** The potential benefits associated with the proposed concepts include offsetting the development of higher capacity water supply projects. This translates to a potential reduction in environmental impacts associated with the construction and operation of larger water-related facilities. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-3 - Cost, Environmental and Implementation Score Card (Page 4 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Implementation Potential			
External Support	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	TBD[1] - Historically, use of desalination, water recycling and enhanced conservation rather than storage concepts have been viewed as environmentally friendly alternatives and generated more support than storage projects.	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts is likely to be viewed as an environmentally friendly alternative and generate external support.	
	Los Vaqueros Reservoir Expansion	TBD[1]	
	Mirant Desalination with Water Quality Element	TBD[1]	
	Near Bay Bridge Desalination with Water Quality Element	TBD[1]	
	Regional Desalination Project	TBD[2] - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	TBD[1] - Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.	
	South Bay Desalination - Potable Use		
	Water Recycling	TBD[1] - Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.	
Ability to Get Outside Funding	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	TBD[1]	
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation rather than storage concepts, as well	
	Los Vaqueros Reservoir Expansion	TBD[1]	
	Mirant Desalination with Water Quality Element	TBD[1]	
	Near Bay Bridge Desalination with Water Quality Element	TBD[1]	
	Regional Desalination Project	TBD[2] - Scoring of implementation issues will depend on specific locations and operation of facilities.	
	South Bay Desalination - Irrigation Use	TBD[1] - Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.	
	South Bay Desalination - Potable Use		
	Water Recycling	TBD[1] - The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds.	
Consistency with Local and Regional Plans	All concepts	NA - Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.	

1. To be determined in future studies.
2. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-3 - Cost, Environmental and Implementation Score Card (Page 5 of 5)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Regional Perspective			
Number of Agencies Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	3	ACWD, SCVWD, SFPUC (retail and wholesale)
	Calaveras Reservoir Expansion - Water Quality		
	East Bay Saline Groundwater Desalination	2	ACWD, SFPUC
	Los Vaqueros Reservoir Expansion	4	ACWD, CCWD, SCVWD, Zone 7, SFPUC
	Mirant Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Near Bay Bridge Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Regional Desalination Project	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	3	BAWSCA, SFPUC, SCVWD
	South Bay Desalination - Potable Use		
	Water Recycling	6,000,000 people	
Population Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	NA	
	Calaveras Reservoir Expansion - Water Supply	4,700,000 people	
	Calaveras Reservoir Expansion - Water Quality	4,700,000 people	
	East Bay Saline Groundwater Desalination	2,200,000 people	
	Los Vaqueros Reservoir Expansion	4,400,000 people	
	Mirant Desalination with Water Quality Element	280,000 people	
	Near Bay Bridge Desalination with Water Quality Element	280,000 people	
	Regional Desalination Project	TBD[1]	Overall impacts and benefits will depend on specific sites selected in Regional Study
	South Bay Desalination - Irrigation Use	3,700,000 people	
	South Bay Desalination - Potable Use		
	Water Recycling	6,000,000 people	

1. Location of facilities, projected costs, and projected impacts and benefits will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-4 - Environmental Score Card (Page 1 of 5)

Measure/Objective	**Concept**	**Concept Rating**
Aquatic Environment		
Potential Impacts to Aquatic Environment	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Reservoir expansion could affect upstream perennial and intermittent streams (including Arroyo Hondo and Calaveras Creek), which could then affect habitat for fish. In addition, concept development may affect steelhead restoration within the Alameda Creek watershed. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities for the Calaveras expansion include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed at a ratio deemed appropriate by regulatory agencies (this would require consultation with regulatory agencies, acquisition of permits, and compliance with permit conditions). In addition, continue trout planting.
	Calaveras Reservoir Expansion - Water Quality	
	East Bay Saline Groundwater Desalination	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources). Effects on aquatic resources from brine discharge are not expected if brine is mixed and diluted with wastewater prior to discharge (e.g., use of EBDA facilities). Construction of concept facilities (desal plant, wells, and pipeline) would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Los Vaqueros Reservoir Expansion	**Effects on Aquatic Environment (Before Mitigation). Benefits.** Reduces direct fish losses from water diversions (incremental increase in loss of juvenile fish at the new Delta intakes offset by a substantial reduction in direct fish loss at the SWP [or CVP] diversion facility), through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). **Effects on Aquatic Environment (After Mitigation): No Effect.** The concept was designed to minimize potential effects to aquatic environment. Thus, no mitigation measures would be required.
	Mirant Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 15,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 10,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Regional Desalination Project	TBD[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation impacts to the aquatic environment are not expected as groundwater would be the source water (eliminating potential effects to surface aquatic resources) and brine would be combined with WQCP effluent or power plant blow-down water (to allow for mixing and dilution prior to discharge). Construction of concept facilities (desal plant, wells, and pipeline) could result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-4 - Environmental Score Card (Page 2 of 5)

Measure/Objective	Concept	Concept Rating
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Direct effects from inundation of terrestrial habitat including, but not limited to, non-native grassland; marsh; mixed evergreen forest / coast live oak woodland, Northern coastal scrub; pond; central coast arroyo willow and white alder riparian forest; blue oak woodland; sycamore alluvial woodland; valley oak woodland; and cultivated land) . Highly sensitive communities include: Valley oak woodland, riparian forest, sycamore alluvial woodland, marsh, and an area of potential serpentine associated plants. Additional disturbed acreage associated with construction of other facilities (e.g., pipeline, pump station). **Effects on Terrestrial Environment (After Mitigation): Benefits.** Mitigation opportunities include identification of acreage affected through habitat assessments, and resource restoration or enhancement in and around the watershed. In addition, consultation with regulatory agencies, acquisition of relevant permits, and implementation of permit conditions would be required. Restoration of affected habitat may occur at a 3:1 ratio, or as negotiated with regulatory agencies.
	Calaveras Reservoir Expansion - Water Quality	
	East Bay Saline Groundwater Desalination	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The locations of concept facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, the location of these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new pipelines are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Los Vaqueros Reservoir Expansion	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Total direct effects from both reservoir expansion and facilities construction: - Total direct effects to terrestrial habitat of up to 2,595 acres (permanent and temporary). - 2,081 acres of grassland - 309 acres of oak woodland - 11 acres of chaparral / upland scrub - 0.01 acre of riparian - 3.6 acres of urban-ruderal - 189 acres of agriculture - 1,960 acres from inundation. **Effects on Terrestrial Environment (After Mitigation): Benefits.** The Mitigation strategy would provide for resource enhancement in accordance with CALFED Program guidance and in coordination with regional conservation. It includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres (CALFED, 2004).
	Mirant Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been established, so the actual biological effects cannot be determined. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** The majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual terrestrial effects cannot be defined or quantified. However, these facilities would likely occur along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if other facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Terrestrial Environment (Before Mitigation): Impacts**. Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for each concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restriction on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-4 - Environmental Score Card (Page 3 of 5)

Measure/Objective	Concept	Concept Rating
Wetlands		
Potential Impacts to Wetlands (acreage affected)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Wetlands (Before Mitigation): Impacts.** Direct effects to marsh habitat from inundation. Siting of other permanent facilities and construction of conveyance facilities may also affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities would be similar to those described above for Terrestrial Environment. Affected lands would be restored at a ratio deemed appropriate by regulatory agencies .
	Calaveras Reservoir Expansion - Water Quality	
	East Bay Saline Groundwater Desalination	**Effects on Wetlands (Before Mitigation): Impacts.** A series of bay shore perimeter wells would be developed as part of the concept. These wells would be located in levees between salt evaporation ponds, and thus are not expected to affect wetland resources. Construction of other facilities could temporarily affect wetland resources. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
	Los Vaqueros Reservoir Expansion	**Effects on Wetlands (Before Mitigation): Impacts.** Total direct effects from inundation would be 1.3 acres. **Effects on Wetlands (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes wetlands.
	Mirant Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but not be limited to, restriction on the construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, such effects would likely be temporary in nature. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but are not be limited to, restriction on construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Wetlands (Before Mitigation): Impacts.** As described above, the majority of the desalination treatment facilities would be located on existing power plants or the WQCP. The locations of other facilities (including groundwater wells) have not been determined, so the actual biological effects cannot be defined or quantified. Other facilities would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: site wells at alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may require replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Wetlands (Before Mitigation): Impacts**. Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

Table G22-4 - Environmental Score Card (Page 4 of 5)

Performance	Concept	Concept Rating
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Effects on Special-Status Species (Before Mitigation): Impacts.** Potential effects to species associated with the above identified habitat, including but not limited to seven species that have formal listings as endangered or threatened (in 1998): Bay checkerspot butterfly, Callipe silverspot butterfly, myrtle silverspot butterfly, California red-legged frog, Alameda whipsnake, Aleutian Canada goose, and bald eagle. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities to protect, restore, or enhance the above habitat would also protect these species. In addition, consultation with regulatory agencies, acquisition of relevant permits, and compliance with permit conditions would apply.
	Calaveras Reservoir Expansion - Water Quality	
	East Bay Saline Groundwater Desalination	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. However, effects to wetlands may affect associated special status species, either from facility siting or construction. **Effects on Special-Status Species (After Mitigation): No Effect.** Mitigation opportunities for wetlands would be the same as those identified above for Wetlands Resources. Protection of wetlands (or provision of additional wetlands) would protect special status wetland species.
	Los Vaqueros Reservoir Expansion	**Effects on Special-Status Species (Before Mitigation): Impacts.** Each habitat type identified under "terrestrial environment," above, is associated with special status species, including but not limited to: - San Joaquin kit fox, - California red-legged frog, - California tiger salamander, - Western pond turtle, - Bald eagle, - Curved-foot hygrotis diving beetle, - Mason's lilaeopsis, - Alkali milk-vetch, - Heartscale, - Brittlescale, - San Joaquin spearscale, - Recurved larkspur, - Contra Costa goldfields, - Vernal pool fairly shrimp, etc. **Effects on Special-Status Species (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes protection of habitat that support these species.
	Mirant Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to, preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Regional Desalination Project	**TBD**[1] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special-status species to a large extent. Any effects to special-status species would likely be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	South Bay Desalination - Potable Use	
	Water Recycling	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).

1. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

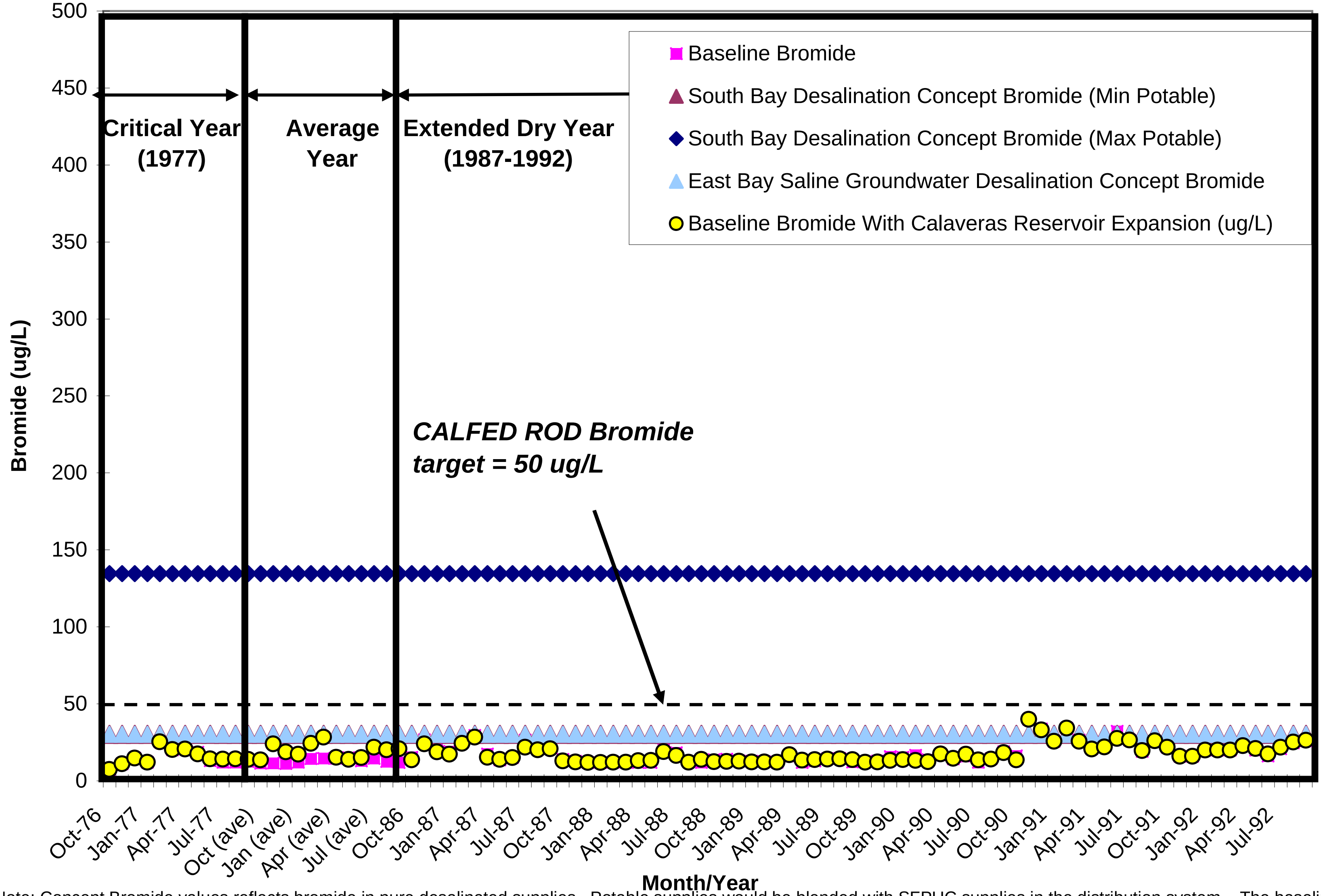
Table G22-4 - Environmental Score Card (Page 5 of 5)

Performance	Concept	Concept Rating
Energy Consumption		
Potential Increases in Energy Consumption (amount of energy required for facility operation) Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	Bay Area Use of the Freeport Regional Water Project	NA
	Calaveras Reservoir Expansion - Water Supply	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD**[1]. The energy requirement associated with concept operation is not known. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** More information would be required to identify potential effects and mitigation opportunities.
	Calaveras Reservoir Expansion - Water Quality	
	East Bay Saline Groundwater Desalination	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD.** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant and related facilities. As Hetch Hetchy hydropower (via the Newark Substation) would provide energy to operate concept facilities, no increase in pollutant emissions is anticipated. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD.** No increase in pollutant emissions is anticipated. Mitigation opportunities have not been identified to reduce the increase in energy usage.
	Los Vaqueros Reservoir Expansion	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** The proposed concept would consume 183 million kwh of energy. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants.
	Mirant Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.
	Near Bay Bridge Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.
	Regional Desalination Project	TBD[2] - Will depend on specific sites, sizes and operations.
	South Bay Desalination - Irrigation Use	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Generally, energy requirements would be 3,250 kwh/mg of water (CDM, 2004). The energy demand of an individual desal facility is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
	South Bay Desalination - Potable Use	
	Water Recycling	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.

1. To be determined in future studies.
2. Location and size of facilities and details of operation will be developed in later phases of the Regional Desalination Project and will not be incorporated into the current BAWQ&SRP.

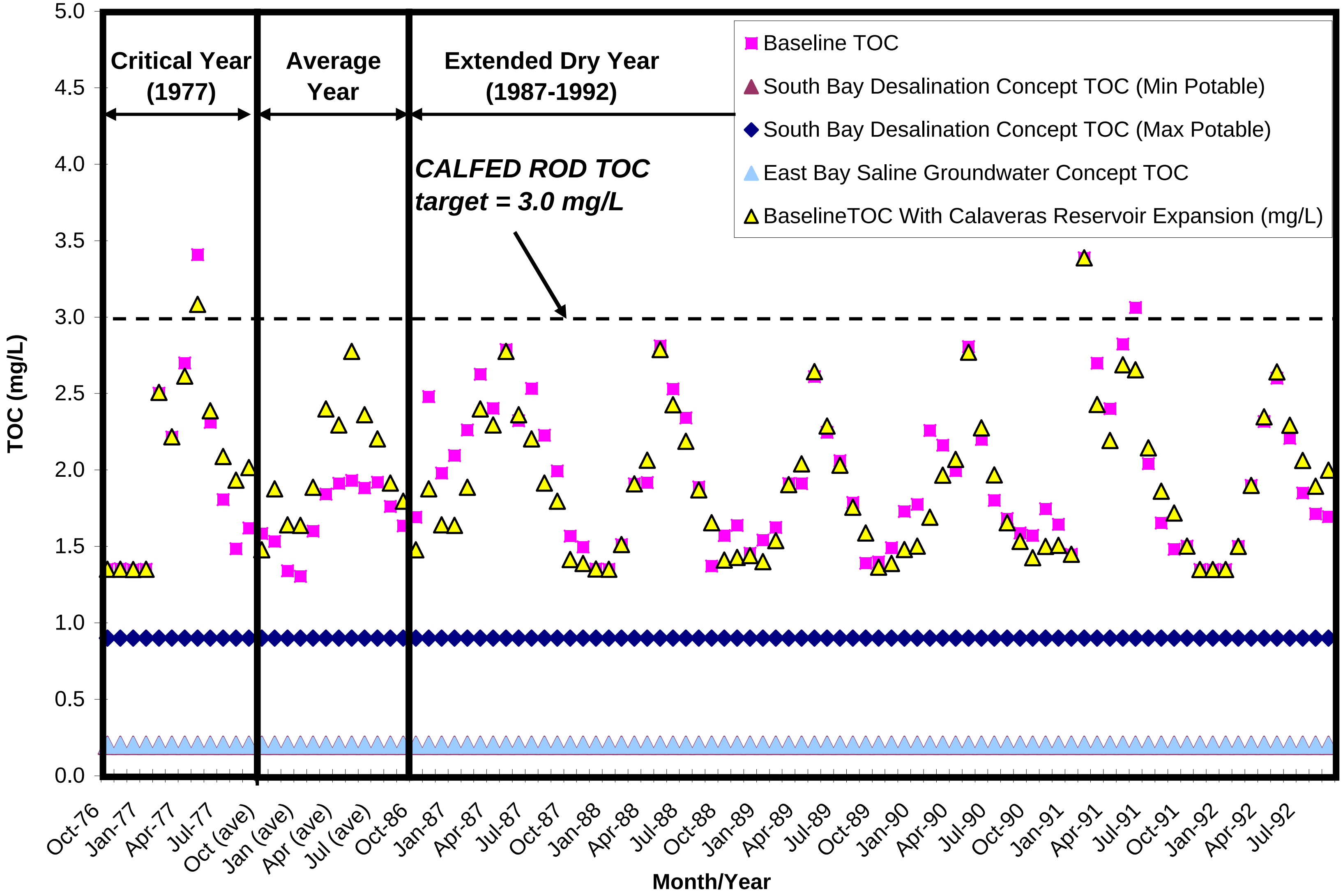
SFPUC: Comparison of Concepts

Comparison of SFPUC Source Water Bromide with Concept Bromide



Note: Concept Bromide values reflects bromide in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline bromide with Calaveras is the projected source water quality with the reservoir expansion.

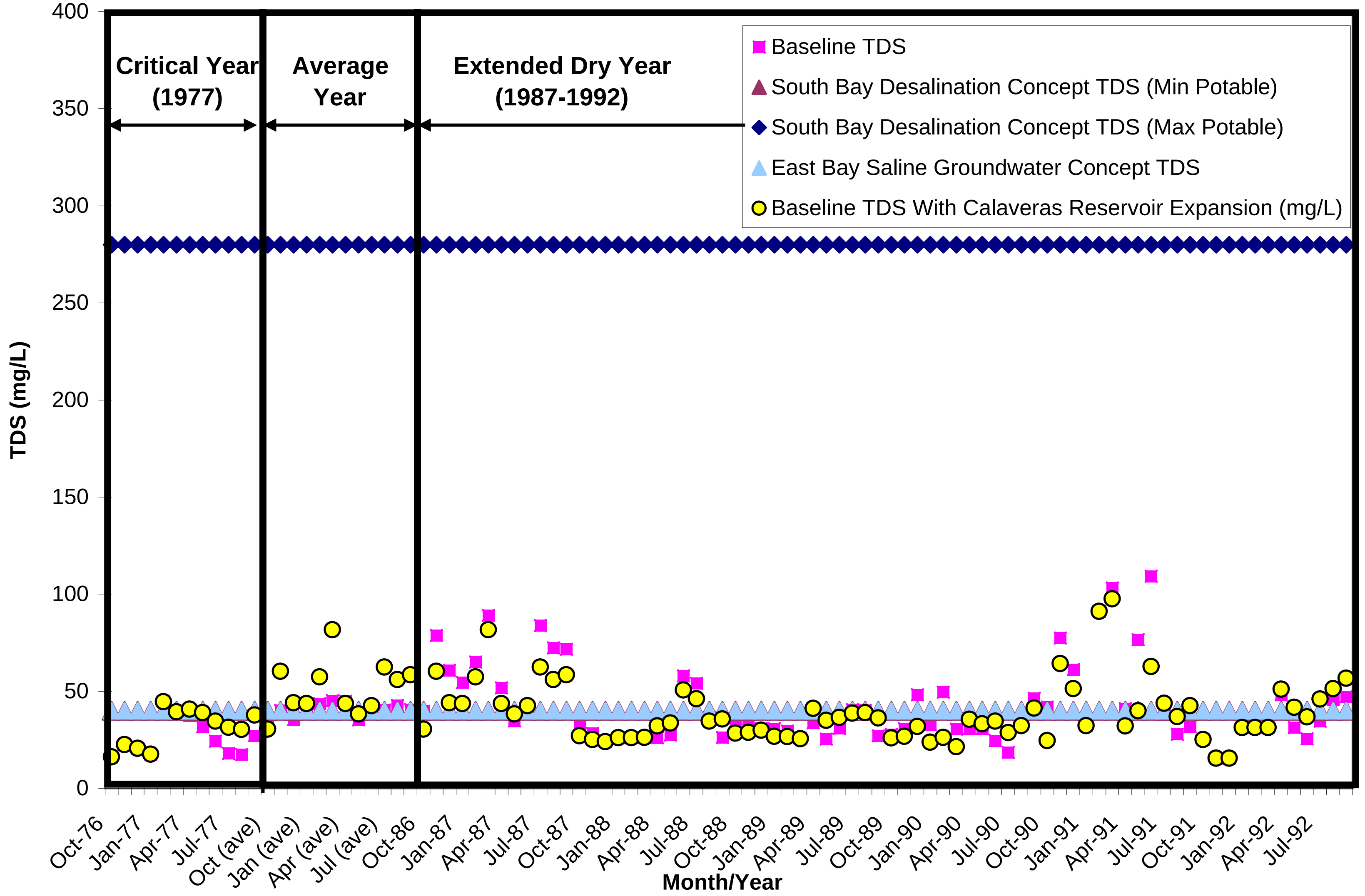
Comparison of SFPUC Source Water TOC with Concept TOC



Note: Concept TOC values reflects TOC in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline TOC with Calaveras is the projected source water quality with the reservoir expansion.

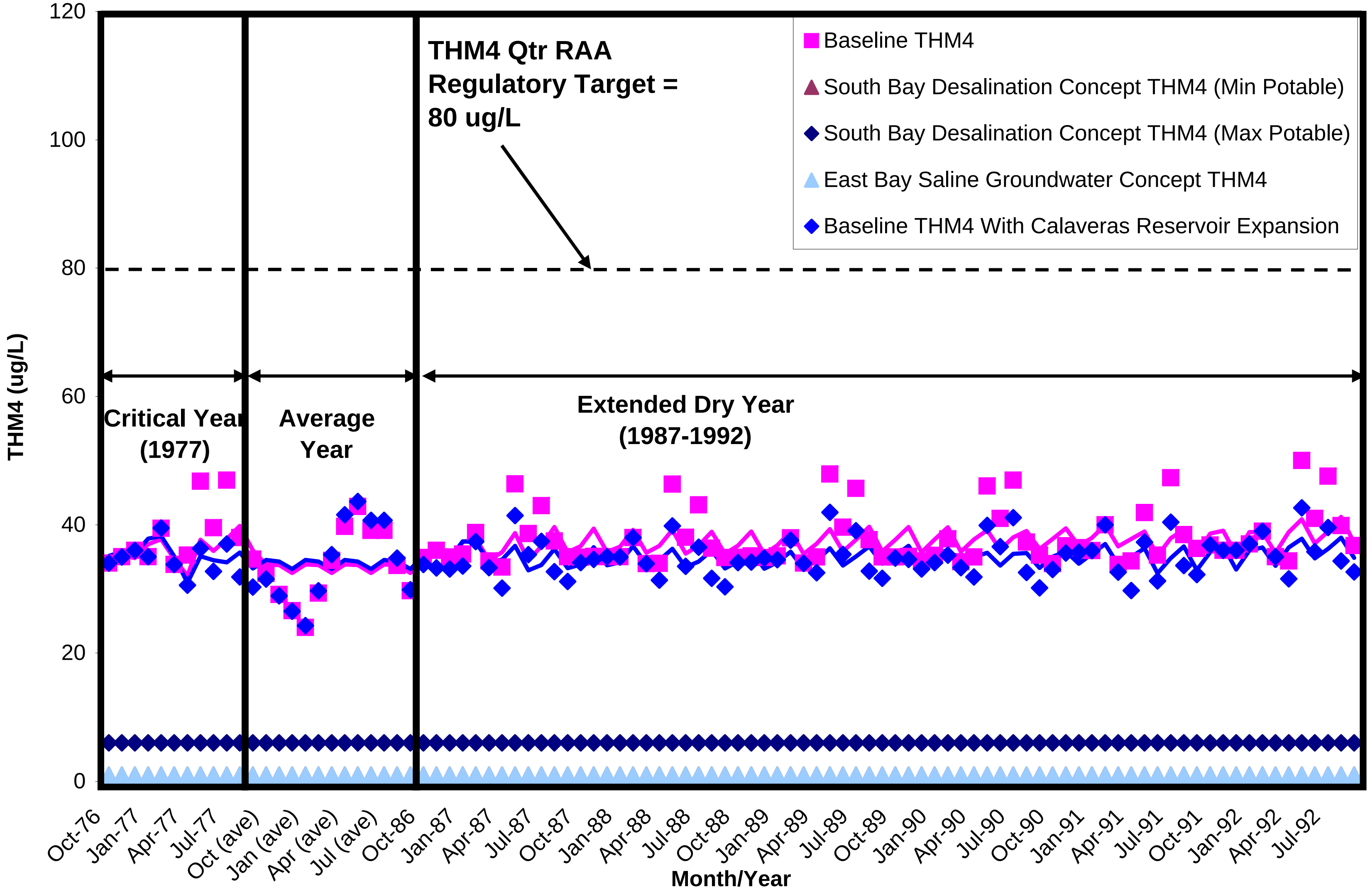
SFPUC: Comparison of Concepts

Comparison of SFPUC Source Water TDS with Concept TDS



Note: Concept TDS values reflects TDS in pure desalinated supplies. Potable supplies would be blended with SFPUC supplies in the distribution system. The baseline TDS with Calaveras is the projected source water quality with the reservoir expansion.

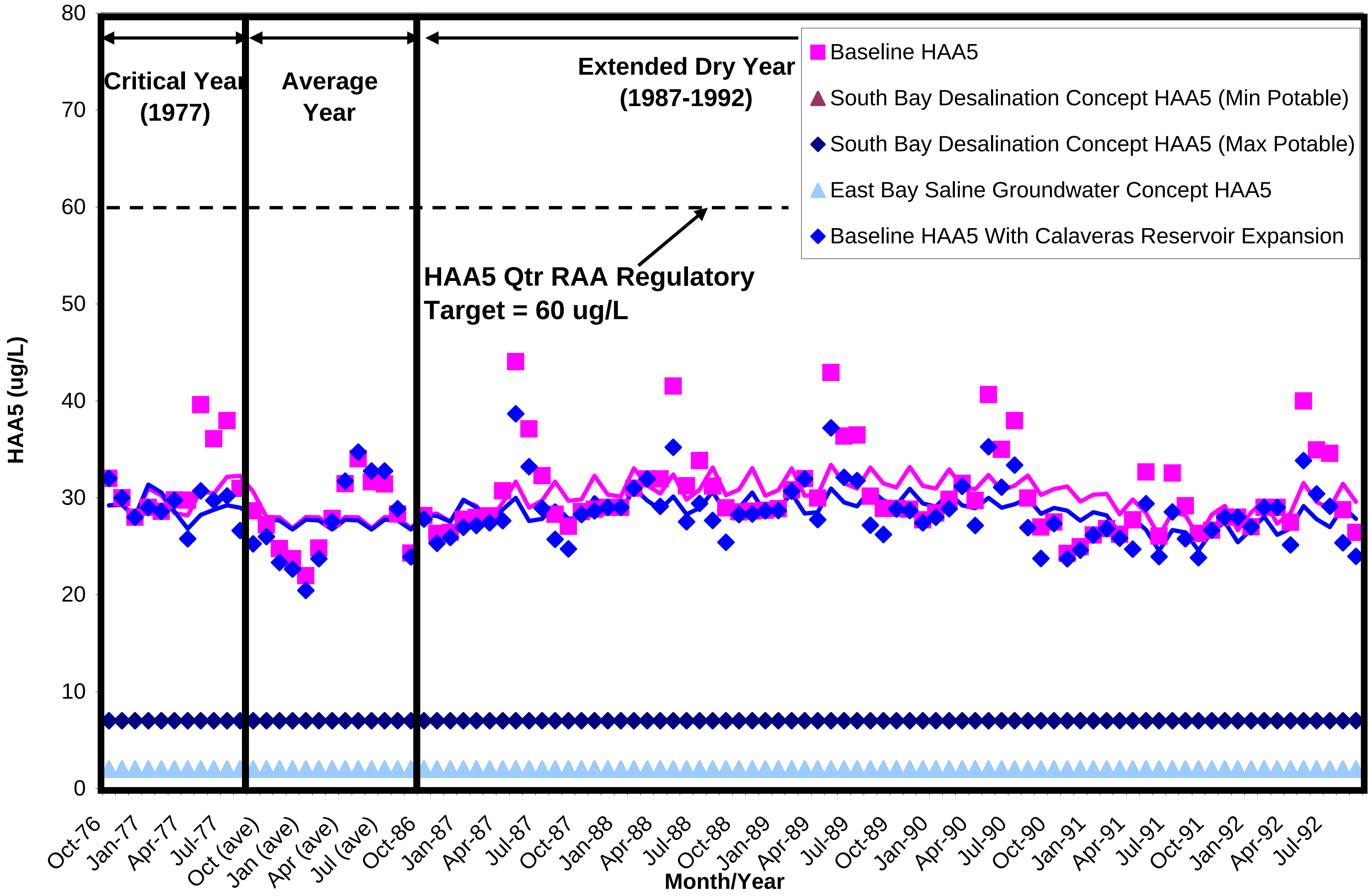
Comparison of SFPUC Baseline THM4 with Concept THM4



Note: Concept THM4 reflects THM4 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. The baseline THM4 with Calaveras Reservoir Expansion is the projected blended treated water quality entering the BDPLs with the reservoir expansion.

SFPUC: Comparison of Concepts

Comparison of SFPUC Baseline HAA5 with Concept HAA5



Note: Concept HAA5 reflects HAA5 in each pure desalinated supply. These would be blended with SFPUC supplies in the distribution system. The baseline HAA5 with Calaveras Reservoir Expansion is the projected blended treated water quality entering the BDPLs with the reservoir expansion.

G23 Zone 7 Concepts

G23 Zone 7 Water Agency : All Concepts

DESCRIPTION

Zone 7 Water Agency (Zone 7) is a potential beneficiary for the following concepts:

- Los Vaqueros Reservoir Expansion.
- Mirant Desalination with Water Quality Element
- Near Bay Bridge Desalination with Water Quality Element
- Bay Area Use of Freeport Regional Water Project
- Enhanced Conservation
- Recycled Water Concepts

The attached scorecard summarizes information for five of these concepts. Enhanced conservation is not included on the scorecards because no specific conservation thresholds have been established.

Zone 7 Concepts Summary

Los Vaqueros Reservoir Expansion	
Average Year Water Quality	71,000 AFY
Dry Year Water Quality	12,000 to 14,000 AFY
Mirant Desalination with Water Quality	
Average Year Water Quality	15,000 AFY
Dry Year Supply Reliability	0 AFY
Near Bay Bridge with Water Quality	
Average Year Water Quality	10,000 AFY
Dry Year Supply Reliability	0 AFY
Bay Area Use of Freeport Regional Water Project	
Average Year Water Quality	15,000 AFY
Dry Year Supply Reliability	0 AFY
Enhanced Conservation	
Supply, All Years	TBD in future studies.
Recycled Water Concepts	
Supply, All Years	Up to 6,900 AFY

Each of the concepts and the potential benefits for Zone 7 are summarized below.

❑ *Los Vaqueros Reservoir Expansion*

The Los Vaqueros Reservoir Expansion concept would involve an increase in capacity from the existing size of 100,000 acre-feet (AF) up to 500,000 AF. The CALFED Los Vaqueros Reservoir Expansion Studies Team is evaluating two reservoir capacities (300,000 AF and 500,000 AF), two diversion capacities (1,000 cubic feet/second (cfs) and 1,750 cfs) and different operating modes. Water quality benefits are provided in all cases.

For the Bay Area Water Quality and Supply Reliability (BAWQ&SR) Program, study, the multipurpose operating scenario for a 500,000 AF reservoir, with 1,750 cfs diversion capacity is presented. This scenario was selected for evaluation in the BAWQ&SR Program as an example of the types of benefits this concept can provide. This scenario includes dry-year supply reliability benefits (42,000 acre-feet/year (AFY) during extended drought), average year water quality benefits (121,000 AFY) and water for Environmental Water Account (EWA) management. Potential beneficiaries are Contra Costa Water District (CCWD), Alameda County Water District (ACWD), Santa Clara Valley Water District (SCVWD), and Zone 7. All agencies except Zone 7 would have both dry-year supply reliability and water quality benefits. Zone 7, who is not seeking dry-year supply reliability water, would be a water quality beneficiary. There may be potential for the SFPUC to also benefit from Los Vaqueros Reservoir Expansion. This may be considered in future studies.

Los Vaqueros studies estimate that 12,000 AFY entitlement water could be delivered via Los Vaqueros Reservoir to Zone 7 in a critically dry year, and that 14,000 AFY entitlement water could be delivered in an extended drought period, resulting in dry-year water quality benefits. Zone 7 would receive a water quality benefit from entitlement deliveries in average years. For 1984, which is used as an example of a normal hydrologic year, 71,000 AFY is delivered to Zone 7, the entire entitlement delivery in this year.

❑ *Mirant Desalination with Water Quality Element*

This concept involves co-location of a 40 million gallons per day (MGD) desalination plant at either the Mirant Pittsburg Power Plant, in Pittsburg, or the Mirant Contra Costa Power Plant in Antioch, and conveyance of up to 25 MGD of desalinated water in average years to Zone 7 for water quality blending. This concept could potentially be implemented if the Regional Desalination Project, which is evaluating desalination plants at a number of different locations, were to develop a desalination plant at one of the Mirant sites. A 40 MGD facility is assumed, based on preliminary sizing evaluated for the Mirant site. The Mirant Desalination with Water Quality Element concept has not been evaluated by the Regional Desalination Project partners.

Zone 7 could receive up to 15,000 AFY in winter months of average and wet years. This concept uses the same interconnection facilities and timing of deliveries for Zone 7 as the Near Bay Bridge Desalination with Water Quality Element and Bay Area Use of Freeport Regional Water Project, so only one of these concepts could be implemented.

❑ *Near Bay Bridge Desalination with Water Quality Element*

The Near Bay Bridge Desalination with Water Quality Element concept would involve location of a 40 MGD desalination plant near the East Bay Municipal Utility District (EBMUD) Regional Wastewater Treatment Plant (WWTP), located in Oakland at the eastern end of the Bay Bridge, and conveyance of up to 25 MGD of desalinated water in average years to Zone 7 for water quality blending.

This concept could potentially be implemented if the Regional Desalination Project, which is evaluating desalination plants at a number of different locations, were to develop a desalination plant at the Near Bay Bridge site.

Zone 7 could receive up to 10,000 AFY in winter months of average and wet years. This concept uses the same interconnection facilities and timing of deliveries for Zone 7 as the Mirant Desalination with Water Quality Element and Bay Area Use of Freeport Regional Water Project, so only one of these concepts could be implemented.

❑ *Bay Area Use of Freeport Regional Water Project*

EBMUD and Sacramento County Water Agency (SCWA) have formed a Joint Powers Authority called the Freeport Regional Water Authority (FRWA) to implement the Freeport Regional Water Project (FRWP). The project would provide up to 100 MGD of dry-year supply for EBMUD from a new diversion located on the Sacramento River near Freeport. New pipelines would convey water from the Sacramento River to the Folsom South Canal, and from the canal to the EBMUD Mokelumne Aqueducts. During winter months of average and wet years, up to 25 MGD could potentially be delivered through the Freeport facilities and EBMUD system to Zone 7 for water quality blending.

Zone 7 could receive up to 15,000 AFY in winter months of average and wet years. This concept uses the same interconnection facilities and timing of deliveries for Zone 7 as the Mirant Desalination with Water Quality Element and Near Bay Bridge Desalination with Water Quality Element, so only one of these concepts could be implemented.

❑ *Enhanced Conservation*

The Enhanced Conservation Concept includes activities that are not currently projected to be cost-effective within the study timeframe, such as incentives for water efficient technologies (e.g., commercial dishwashers, low flow pre-rinse spray nozzles, x-ray processor technology); education and incentives for new water efficient landscape technologies (e.g., self-adjusting evapotranspiration (ET) based sprinkler timers, drought tolerant gardening); and pricing incentives (e.g., tiered rate structures). In addition, the Enhanced Conservation Concept includes opportunities for regional cooperation to increase effectiveness of certain measures, including regional public outreach, research collaboration, regional efforts to standardize product labeling, Bay Area School sponsored Conservation Calendar, and regional collaboration on Demonstration Gardens and Bay Area Landscaping Guides. Measures included in the Enhanced Conservation Concept are above and beyond the projected 180,000 AFY of Bay Area conservation projects currently being planned by the year 2020.

❑ *Water Recycling*

Twenty-six water recycling concepts have been carried forward for detailed evaluated in the BAWQ&SR Program. These recycled water projects will provide up to 97,000 AFY of water for meeting non-potable demands, such as irrigation and industrial uses. This will result in a reduction in potable supply shortfalls, improving the supply reliability for the participating agencies. Potable supplies offset by the recycled water supply are assumed to meet demand, and are not available for exchange between agencies. As such, there is no water quality element associated with these concepts. This portfolio assumes that up to 97,000 AFY of water recycling could be implemented, though given competition for funding, implementation issues and other factors it is unlikely that all projects identified would proceed.

Zone 7 is a potential beneficiary for three recycled water concepts with a total yield of 6,900 AFY

- Expanded DERWA Recycled Water Project (1,400 AFY)
- Livermore Agricultural Recycled Water Project (2,700 AFY)
- Livermore Municipal Recycled Water Project (2,200 AFY to 2,800 AFY)

Table G23-1 - Supply Reliability Score Card

	Agency Baseline		**Concept/Portfolio**		**Agency Baseline Plus Concept/Portfolio**		
Concept or Example Portfolio	**Amount or Description**	**Units**	**Amount or Description**	**Units**	**Amount or Description**	**Units**	**Notes/Other**
Meet Demand							
Critical Drought							Zone 7 is not seeking additional dry year supplies. As such, all new supplies resulting from concept involvement are assumed to offset existing supplies, with no net increase in total supplies. The Los Vaqueros Reservoir Expansion results are reported for 500,000 AF reservoir with 1,750 cfs diversion, and both water quality and supply reliability objectives (Scenario 5A). The Bay Area Use of the Freeport Regional Water Project involves the use of the Freeport Project facilities by Zone 7 for water quality improvements in average years. The Freeport Project is being used by EBMUD in drought years. Zone 7 is an average year water quality beneficiary of the Near Bay Bridge concept. EBMUD could receive dry-year supply from the Near Bay Bridge Desalination facility for its West of Hills (WOH) System. In winter months of average and wet years, water could be conveyed to Zone 7 via the WOH system, and Southern Loop, and East of Hills (EOH) System, to a new interconnection sized to deliver up to 20 MGD to the Zone 7 system, when excess capacity is available in the EBMUD distribution system. Zone 7 is also an average year water quality beneficiary of the Mirant Desalination Concept. In average years, supply from the Mirant Desalination with Water Quality Element concept would potentially be conveyed through the EBMUD Mokelumne Aqueduct, treated and conveyed through the distribution system, for delivery to Zone 7, via a new intertie connecting EBMUD's San Ramon Valley system with Zone 7 transmission facilities. Zone 7 is a potential dry and average year water supply beneficiary from water recycling and enhanced conservation.
Bay Area Use of the Freeport Regional Water Project	38,900	AFY	0	AFY	38,900	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion[1]	38,900	AFY	0	AFY	38,900	AFY	
Mirant Desalination with Water Quality Element	38,900	AFY	0	AFY	38,900	AFY	
Near Bay Bridge Desalination with Water Quality Element	38,900	AFY	0	AFY	38,900	AFY	
Regional Desalination Project	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	38,900	AFY	Up to 6,890	AFY	38,900	AFY	
Extended Drought							
Bay Area Use of the Freeport Regional Water Project	56,400	AFY	0	AFY	56,400	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion[1]	56,400	AFY	0	AFY	56,400	AFY	
Mirant Desalination with Water Quality Element	56,400	AFY	0	AFY	56,400	AFY	
Near Bay Bridge Desalination with Water Quality Element	56,400	AFY	0	AFY	56,400	AFY	
Regional Desalination Project	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	56,400	AFY	Up to 6,890	AFY	56,400	AFY	
Average Year							
Bay Area Use of the Freeport Regional Water Project	71,400	AFY	15,000	AFY	71,400	AFY	
Calaveras Reservoir Expansion - Water Supply	N/A	AFY	N/A	AFY	N/A	AFY	
Calaveras Reservoir Expansion - Water Quality	N/A	AFY	N/A	AFY	N/A	AFY	
East Bay Saline Groundwater Desalination	N/A	AFY	N/A	AFY	N/A	AFY	
Los Vaqueros Reservoir Expansion[1]	71,400	AFY	0	AFY	71,400	AFY	
Mirant Desalination with Water Quality Element	71,400	AFY	15,000	AFY	71,400	AFY	
Near Bay Bridge Desalination with Water Quality Element	71,400	AFY	10,000	AFY	71,400	AFY	
Regional Desalination Project	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Irrigation Use	N/A	AFY	N/A	AFY	N/A	AFY	
South Bay Desalination - Potable Use	N/A	AFY	N/A	AFY	N/A	AFY	
Water Recycling	71,400	AFY	Up to 6,890	AFY	71,400	AFY	
Vulnerability							
Bay Area Use of the Freeport Regional Water Project	Delta supply sources susceptible to liquefaction of Delta levees.		Reduces Vulnerability - Provides separate connection point to Zone 7 if South Bay Aqueduct or Delta supply were interrupted. Availability limited to winter months of average years, during non-emergency conditions in EBMUD system.				
Calaveras Reservoir Expansion - Water Supply			N/A				
Calaveras Reservoir Expansion - Water Quality			N/A				
East Bay Saline Groundwater Desalination			N/A				
Los Vaqueros Reservoir Expansion			Reduces Vulnerability - Los Vaqueros Reservoir expansion reduces vulnerability of CCWD and SBA contractors to potential Delta water quality problems. The expansion also provides redundancy in the case of operational problems at Harvey O. Banks PP or Sout				
Mirant Desalination with Water Quality Element			Reduces Vulnerability - Provides separate connection point to Zone 7 if South Bay Aqueduct were interrupted. Availability limited to winter months of average years, during non-emergency conditions in EBMUD system.				
Near Bay Bridge Desalination with Water Quality Element			Reduces Vulnerability - Provides separate connection point to Zone 7 if South Bay Aqueduct were interrupted. Availability limited to winter months of average years, during non-emergency conditions in EBMUD system.				
Regional Desalination Project			N/A				
South Bay Desalination - Irrigation Use			N/A				
South Bay Desalination - Potable Use			N/A				
Water Recycling			No Effect on Vulnerability. Since concepts provide non-potable supplies, they do not reduce the vulnerability of potable systems of potential participating agencies.				
Self-Sufficiency within the Region							
Bay Area Use of the Freeport Regional Water Project	No Effect on Self-Sufficiency within the Region - Agreements required with EBMUD, who would control project operation. Project implementation would not only require agreements between Zone 7 and EBMUD, but could involve the State of California (changes t						
Calaveras Reservoir Expansion - Water Supply	N/A						
Calaveras Reservoir Expansion - Water Quality	N/A						
East Bay Saline Groundwater Desalination	N/A						
Los Vaqueros Reservoir Expansion	Increases Self-Sufficiency within the Region - Under all institutional structures, CCWD would retain ownership and control of the watershed and operations of the project (CALFED, 2004). An ownership agreement would be developed outlining this. A governi						
Mirant Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would contro						
Near Bay Bridge Desalination with Water Quality Element	Increases Self-Sufficiency within Region - Partner agencies in Regional Desalination Project will be determining specific institutional/operational arrangements as part of the RDP, but project would be locally controlled. EBMUD and/or Zone 7 would cont						
Regional Desalination Project	N/A						
South Bay Desalination - Irrigation Use	N/A						
South Bay Desalination - Potable Use	N/A						
Water Recycling	Increases Self-Sufficiency within Region. Concepts will be owned, operated, and controlled locally.						

1. Los Vaqueros Reservoir Expansion concept supply quantities reflect supply reliability increment only and do not include EWA water. Supply quantities exclude Semitropic groundwater banking program deliveries
Zone 7 is not seeking additional supply reliability at this time.

Table G23-2 - Public Health Protection Scorecard (Page 1 of 2)

	Concept		**Agency Baseline Plus Concept**		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus Zone 7 Source Water**	**Concept Plus Zone 7 Treated Water**	**Notes**
Variability for Treatment					
Bay Area Use of the Freeport Regional Water Project	Reduces Variability	NA	NA	NA	All parameters less variable for customers receiving Freeport water.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	Reduces Variability for Treatment	NA	Reduction in variability of all parameters for all hydrologies
Mirant Desalination with Water Quality Element	NA	NA	NA	NA	Zone 7 receives treated supplies.
Near Bay Bridge Desalination with Water Quality Element	NA	NA	NA	NA	No impact on source water quality.
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Total Dissolved Solids					
Bay Area Use of the Freeport Regional Water Project	Reduces TDS	Reduces TDS	NA	NA	TDS reduced for customers receiving Freeport supply.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	Reduces TDS	Reduces TDS	Reduction in TDS for all hydrologies
Mirant Desalination with Water Quality Element	NA	Reduces TDS	NA	NA	
Near Bay Bridge Desalination with Water Quality Element	NA	Reduces TDS	NA	NA	Improved quality over Zone 7 average year TDS.
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Disinfection By-Products					
Bay Area Use of the Freeport Regional Water Project	NA	Reduces DBPs	NA	NA	All DBPs reduced for customers receiving Freeport water
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	Reduces DBPs	Overall decrease in DBPs with respect to regulatory targets
Mirant Desalination with Water Quality Element	NA	Reduces DBPs	NA	NA	All DBPs except bromate reduced for Zone 7 customers receiving blended Mokelumne/Mirant water. Bromate present only in very low concentrations, at or near the detection limit.
Near Bay Bridge Desalination with Water Quality Element	NA	Reduces DBPs	NA	NA	All DBPs reduced for Zone 7 customers receiving Near Bay Bridge water.
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		

Table G23-2 - Public Health Protection Scorecard (Page 2 of 2)

	Concept		**Quantity of Water Conveyed through the Expanded Reservoir**		
Performance Measure/Objective	**Concept Source Water**	**Concept Treated Water**	**Concept Plus Zone 7 Source Water**	**Concept Plus Zone 7 Treated Water**	**Notes**
Taste and Odor Problems (Excluding TDS)					
Bay Area Use of the Freeport Regional Water Project	NA	Improves T&O	NA	NA	Improved overall quality for customers receiving Freeport water.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	
Los Vaqueros Reservoir Expansion	NA	NA	NA	Improves T&O	
Mirant Desalination with Water Quality Element	NA	Improves T&O	NA	NA	Improved overall quality for customers receiving Mokelumne/Mirant water
Near Bay Bridge Desalination with Water Quality Element	NA	Improves T&O	NA	NA	Improved overall quality for customers receiving Near Bay Bridge water.
Regional Desalination Project	NA	NA	NA	NA	
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	
South Bay Desalination - Potable Use	NA	NA	NA	NA	
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Known Impacts (TDS, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	Incremental impacts associated with operating the Freeport conveyance facilities in average years are projected to be minimal.
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	NA
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	NA
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	NA
Los Vaqueros Reservoir Expansion	NA	NA	No Effect on Potential for Degradation	No Effect on Potential for Degradation	The potential for degradation due to known impacts is not projected to increase with the expanded reservoir.
Mirant Desalination with Water Quality Element	NA	Reduces Potential for Degradation	NA	NA	Mirant water quality is slightly degraded as compared with EBMUD baseline, but represents an improvement over the Zone 7 baseline.
Near Bay Bridge Desalination with Water Quality Element	NA	Reduces Potential for Degradation	NA	NA	Near Bay Bridge water quality is slightly degraded as compared with EBMUD baseline, but represents an improvement over the Zone 7 baseline.
Regional Desalination Project	NA	NA	NA	NA	NA
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	NA
South Bay Desalination - Potable Use	NA	NA	NA	NA	NA
Water Recycling	N/A	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins.		
Potential for Water Quality Degradation from Emerging Contaminants (algal biotoxins, pharmaceuticals, NDMA, etc)					
Bay Area Use of the Freeport Regional Water Project	NA	NA	NA	NA	
Calaveras Reservoir Expansion - Water Supply	NA	NA	NA	NA	NA
Calaveras Reservoir Expansion - Water Quality	NA	NA	NA	NA	NA
East Bay Saline Groundwater Desalination	NA	NA	NA	NA	NA
Los Vaqueros Reservoir Expansion	NA	NA	TBD[1]	TBD[1]	Algal biotoxin potential in the expanded reservoir is actively being studied by the LVE Project Team.
Mirant Desalination with Water Quality Element	NA	Potential for Degradation	NA	NA	Emerging contaminants are not expected to be a factor with desalinated brackish supplies.
Near Bay Bridge Desalination with Water Quality Element	NA	Potential for Degradation	NA	NA	Emerging contaminants such as algal biotoxins may be a factor with desalinated bay water supplies.
Regional Desalination Project	NA	NA	NA	NA	NA
South Bay Desalination - Irrigation Use	NA	NA	NA	NA	NA
South Bay Desalination - Potable Use	NA	NA	NA	NA	NA
Water Recycling	Increases Potential for Degradation	N/A	Recycled water projects are assumed to have no benefit or impact to potable water quality with the exception of potential impacts to groundwater quality if advanced treatment is not pursued for concepts implemented over groundwater basins. Even with adva		

1. To be determined in future studies.

Table G23-2a - Public Health Protection Score Card by Agency

Concept: Los Vaqueros Reservoir Expansion

			Agency Baseline			Quantity of Water Conveyed through the Expanded Reservoir[1]		Baseline Plus Concept			
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Los Vaqueros Expansion Concept Source Water**	**Los Vaqueros Expansion Concept Treated Water**	**Los Vaqueros Expansion plus Agency Baseline Source Water**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (PPWTP)**	**Los Vaqueros Expansion plus Agency Baseline Treated Water (DVWTP)**	**Notes**
Supply Quantity											
Critical Year		AFY	38,900			12,181		38,900			
Extended Dry Year		AFY	56,400			14,394		56,400			
Average Year		AFY	71,400			71,400		71,400			
Variability for Treatment											
Critical Year											
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	0.09 - 0.24	0.09 - 0.24	0.09 - 0.24	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	0.12	0.12	0.12	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	1.8 - 3.4	1.8 - 3.4	1.8 - 3.4	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	2.4	2.4	2.4	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Extended Dry Year											
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	0.02 - 0.44	0.10 - 0.15	0.10 - 0.15	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	0.15	0.12	0.12	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	1.6 - 6.3	1.6 - 1.6	1.6 - 1.6	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	2.7	1.6	1.6	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Average Year											
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	NA	NA	0.10 - 0.15	0.02 - 0.44	0.02 - 0.44	
	Mean	mg/L	0.19	0.15	0.15	NA	NA	0.12	0.15	0.15	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	NA	NA	1.6 - 1.6	1.6 - 6.3	1.6 - 6.3	
	Mean	mg/L	4.0	3.7	3.7	NA	NA	1.6	2.7	2.7	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	somewhat variable	constant	constant	
Temperature	Qual		variable	less variable	less variable	NA	NA	variable	less variable	less variable	
Total Dissolved Solids											
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	187 - 355	196 - 365	196 - 365	
	Mean	mg/L	507	517	517	NA	NA	221	231	231	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	147 - 597	157 - 607	157 - 607	
	Mean	mg/L	384	394	394	NA	NA	253	263	263	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	NA	NA	192 - 251	201 - 261	201 - 261	
	Mean	mg/L	296	306	306	NA	NA	218	228	228	
Disinfection Byproducts											
Critical Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	55 - 81	56 - 84	
	Mean	ug/L	NA	86	89	NA	NA	NA	63	65	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	39 - 51	40 - 52	
	Mean	ug/L	NA	44	46	NA	NA	NA	43	44	
Extended Dry Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	38 - 105	40 - 108	
	Mean	ug/L	NA	67	67	NA	NA	NA	60	61	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	29 - 59	31 - 60	
	Mean	ug/L	NA	39	39	NA	NA	NA	40	41	
Average Year											
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	ND - ND	ND - ND	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	ND	ND	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	NA	NA	54 - 56	55 - 57	
	Mean	ug/L	NA	68	69	NA	NA	NA	55	56	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	NA	NA	36 - 38	37 - 39	
	Mean	ug/L	NA	43	43	NA	NA	NA	37	38	
Taste and Odor											
Source of water	Qual		NA	NA	NA	NA	NA	improved overall quality	improved T&O	improved T&O	Overall improvement in source and treated water quality
Algal blooms	Qual		minimal	NA	NA	NA	NA	minimal likelihood	NA	NA	Potential reservoir mixing issues

1. Supply reflected inlcudes all water delivered vis the expanded reservoir for EWA and supply reliability. Concept supply quantities do not include Semitropic groundwater banking program deliveries. Zone 7 is not seeking additional supply reliability at this time.

Table G23-2b - Public Health Protection Score Card by Agency[1]

Concept: Bay Area Use of the Freeport Regional Water Project

			Agency Baseline[2]			**Concept[3]**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Bay Area Use of Freeport Regional Project Source Water[4]**	**Bay Area Use of Freeport Regional Project Treated Water**	**Agency Baseline Plus Bay Area Use of Freeport Regional Project Source Water**	**Agency Baseline Plus Bay Area Use of Freeport Regional Project Treated Water**	**Notes**
Supply Quantity										
Critical Year		AFY	38,900			0		38,900		
Extended Dry Year		AFY	56,400			0		56,400		
Average Year		AFY	71,400			15,000		71,400		
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	0.01 - 0.01	0.01 - 0.01	NA	NA	
	Mean	mg/L	0.19	0.15	0.15	0.01	0.01	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	0.6 - 1.3	0.1 - 0.7	NA	NA	
	Mean	mg/L	4.0	3.7	3.7	1.0	0.5	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	NA	NA	SBA pH is widely variable, but is buffered during treatment. Freeport/Mokelumne blend pH is less variable.
Temperature	Qual		variable	less variable	less variable	variable	variable	NA	NA	SBA temperature is variable.
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	NA	NA	
	Mean	mg/L	507	517	517	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	NA	NA	
	Mean	mg/L	384	394	394	NA	NA	NA	NA	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	32 - 44	51 - 63	NA	NA	
	Mean	mg/L	296	306	306	39	59	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	NA	
	Mean	ug/L	NA	86	89	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	NA	
	Mean	ug/L	NA	44	46	NA	NA	NA	NA	
Extended Dry Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	NA	
	Mean	ug/L	NA	67	67	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	NA	
	Mean	ug/L	NA	39	39	NA	NA	NA	NA	
Average Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	ND	NA	NA	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	3 - 7	NA	NA	
	Mean	ug/L	NA	68	69	NA	6	NA	NA	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	4 - 8	NA	NA	
	Mean	ug/L	NA	43	43	NA	7	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	improved	NA	NA	Higher quality source (lower bromide, TDS, TOC) for customers receiving Freeport/Mokelumne blend
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	Zone 7 does not receive source water from this concept.

1. EBMUD is currently exploring a variety of options for conveying Freeport water to EBMUD customers. For the purposes of this analysis, it was assumed that water will be conveyed to the EBMUD distribution system via the Mokelumne Aqueduct.

2. Baseline water quality data is detailed in the Zone 7 section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Mokelumne-Freeport blend before and after treatment by EBMUD (source and treated columns, respectively) only, and do not reflect the effects of blending with Zone 7 supplies.

Zone 7: Comparison of Concepts

Table G23-2c - Public Health Protection Score Card by Agency [1]

Concept: Mirant Desalination with Water Quality Element

			Agency Baseline[2]			**Concept[3]**		**Baseline Plus Concept**		
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Mirant Desalination with Water Quality Element Source Water[4]**	**Mirant Desalination with Water Quality Element Treated Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Source Water**	**Agency Baseline Plus Mirant Desalination with Water Quality Element Treated Water**	**Notes**
Supply Quantity										
Critical Year		AFY	38,900			0		38,900		
Extended Dry Year		AFY	56,400			0		56,400		
Average Year		AFY	71,400			15,000		71,400		
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	0.01 - 0.01	0.01 - 0.01	NA	NA	
	Mean	mg/L	0.19	0.15	0.15	0.01	0.01	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	0.6 - 1.3	0.1 - 0.7	NA	NA	
	Mean	mg/L	4.0	3.7	3.7	0.9	0.4	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	somewhat variable	constant	NA	NA	SBA pH is widely variable, but is buffered during treatment. Mirant/Mokelumne blend pH is less variable.
Temperature	Qual		variable	less variable	less variable	variable	variable	NA	NA	SBA temperature is variable.
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	NA	NA	
	Mean	mg/L	507	517	517	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	NA	NA	
	Mean	mg/L	384	394	394	NA	NA	NA	NA	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	32 - 39	51 - 59	NA	NA	
	Mean	mg/L	296	306	306	36	55	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	NA	
	Mean	ug/L	NA	86	89	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	NA	
	Mean	ug/L	NA	44	46	NA	NA	NA	NA	
Extended Dry Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	NA	
	Mean	ug/L	NA	67	67	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	NA	
	Mean	ug/L	NA	39	39	NA	NA	NA	NA	
Average Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	ND	NA	NA	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	3 - 7	NA	NA	
	Mean	ug/L	NA	68	69	NA	6	NA	NA	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	4 - 8	NA	NA	
	Mean	ug/L	NA	43	43	NA	7	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	improved	NA	NA	Higher quality source (lower TDS, TOC, bromide) for customers receiving Mirant/Mokelumne blend
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	Zone 7 does not receive source water from this concept.

1. Scores reflect water quality effects resulting from conveyance of Mirant Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. Baseline water quality data is detailed in the Zone 7 section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Mokelumne-Mirant blend before and after treatment by EBMUD (source and treated columns, respectively) only, and do not reflect the effects of blending with Zone 7 supplies.

4. Values in this column represent the quality of the Mokelumne-Mirant blend prior to treatment by EBMUD. Note that Zone 7 does not receive untreated water from this concept (Zone 7 receives this water following treatment by EBMUD). Values are presented for reference with respect to CALFED ROD source water improvement targets.

Table G23-2d - Public Health Protection Score Card by Agency [1]

Concept: Near Bay Bridge Desalination with Water Quality Element

			Agency Baseline[2]			Concept[3]		Baseline Plus Concept		
Performance Measure/Objective	**Metric or Qual**	**Units**	**Zone 7 Source Water (SWP)**	**Zone 7 Treated Water (PPWTP)**	**Zone 7 Treated Water (DVWTP)**	**Near Bay Bridge Desalination with Water Quality Element Source Water**	**Near Bay Bridge Desalination with Water Quality Element Treated Water**	**Agency Baseline Plus Near Bay Bridge Desalination with Water Quality Element Source Water**	**Agency Baseline Plus Near Bay Bridge Desalination with Water Quality Element Treated Water**	**Notes**
Supply Quantity										
Critical Year		AFY	38,900			0		38,900		
Extended Dry Year		AFY	56,400			0		56,400		
Average Year		AFY	71,400			10,000		71,400		
Variability for Treatment										
Critical Year										
Bromide	Range	mg/L	0.17 - 0.53	0.13 - 0.44	0.13 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.37	0.30	0.30	NA	NA	NA	NA	
TOC	Range	mg/L	3.4 - 7.3	3.1 - 6.8	3.1 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	5.1	4.5	4.7	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Extended Dry Year										
Bromide	Range	mg/L	0.05 - 0.51	0.04 - 0.44	0.04 - 0.44	NA	NA	NA	NA	
	Mean	mg/L	0.26	0.21	0.21	NA	NA	NA	NA	
TOC	Range	mg/L	1.6 - 7.3	1.4 - 6.8	1.4 - 6.8	NA	NA	NA	NA	
	Mean	mg/L	3.7	3.4	3.4	NA	NA	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	NA	NA	NA	SBA pH is widely variable, but is buffered during treatment
Temperature	Qual		variable	less variable	less variable	NA	NA	NA	NA	SBA temperature is variable.
Average Year										
Bromide	Range	mg/L	0.08 - 0.38	0.06 - 0.33	0.06 - 0.33	NA	0.11 - 0.11	NA	NA	
	Mean	mg/L	0.19	0.15	0.15	NA	0.11	NA	NA	
TOC	Range	mg/L	2.8 - 5.9	2.5 - 5.4	2.5 - 5.4	NA	0.1 - 0.1	NA	NA	
	Mean	mg/L	4.0	3.7	3.7	NA	0.1	NA	NA	
pH	Qual		somewhat variable	less variable	less variable	NA	somewhat variable	NA	NA	SBA pH is widely variable, but is buffered during treatment. Near Bay Bridge permeate pH is less variable.
Temperature	Qual		variable	less variable	less variable	NA	variable	NA	NA	SBA temperature is variable.
Total Dissolved Solids										
Critical Year	Range	mg/L	276 - 704	285 - 714	285 - 714	NA	NA	NA	NA	
	Mean	mg/L	507	517	517	NA	NA	NA	NA	
Extended Dry Year	Range	mg/L	166 - 675	175 - 685	175 - 685	NA	NA	NA	NA	
	Mean	mg/L	384	394	394	NA	NA	NA	NA	
Average Year	Range	mg/L	180 - 528	189 - 538	189 - 538	NA	150 - 150	NA	NA	
	Mean	mg/L	296	306	306	NA	150	NA	NA	
Disinfection Byproducts										
Critical Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	65 - 125	65 - 125	NA	NA	NA	NA	
	Mean	ug/L	NA	86	89	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	34 - 58	34 - 58	NA	NA	NA	NA	
	Mean	ug/L	NA	44	46	NA	NA	NA	NA	
Extended Dry Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	NA	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	NA	NA	NA	
THM4	Range	ug/L	NA	38 - 116	38 - 117	NA	NA	NA	NA	
	Mean	ug/L	NA	67	67	NA	NA	NA	NA	
HAA5	Range	ug/L	NA	21 - 71	13 - 71	NA	NA	NA	NA	
	Mean	ug/L	NA	39	39	NA	NA	NA	NA	
Average Year										
Bromate	Range	ug/L	NA	ND - ND	ND - ND	NA	ND	NA	NA	
	Mean	ug/L	NA	ND	ND	NA	ND	NA	NA	
THM4	Range	ug/L	NA	55 - 95	55 - 95	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	68	69	NA	1	NA	NA	
HAA5	Range	ug/L	NA	30 - 56	30 - 56	NA	1 - 1	NA	NA	
	Mean	ug/L	NA	43	43	NA	1	NA	NA	
Taste and Odor										
Source of water	Qual		NA	NA	NA	NA	NA	NA	NA	No agencies receive source water from this concept.
Algal blooms	Qual		minimal	NA	NA	NA	NA	NA	NA	

1. Scores reflect water quality effects resulting from conveyance of Near Bay Bridge Desalinated water to Zone 7 in average years, and do not evaluate critical or dry year effects associated with the base RDP project.

2. Baseline water quality data is detailed in the Zone 7 section of the Water Supply and Water Quality Baseline Technical Memorandum.

3. Values in these columns represent the quality of the Near Bay Bridge finished water only, and do not reflect the effects of blending with EBMUD supplies. For the purposes of this study, Near Bay Bridge Desalination permeate TDS was approximated at 150 mg/L.

Table G23-3 - Cost, Environmental and Implementation Score Card (Page 1 of 4)

Performance Measure/Objective	Performance Measure/Objective		Amount or Rating	Notes/Other
Cost Impacts				
Cost Impacts	Bay Area Use of the Freeport Regional Water Project	Capital Cost	TBD[1]	Operating costs for use of Freeport facilities and wheeling through EBMUD system would need to be determined by EBMUD. Conceptual-level intertie costs are estimated to be $24M ($2005). Operational costs have not been estimated. Zone 7 life-cycle costs
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Calaveras Reservoir Expansion - Water Supply	Capital Cost	N/A	
		Operating & Maintenance Cost	N/A	
		Environmental Mitigation Cost	N/A	
		Lifecycle Cost	N/A	
		Allocation of Costs	N/A	
	Calaveras Reservoir Expansion - Water Quality	Capital Cost	N/A	
		Operating & Maintenance Cost	N/A	
		Environmental Mitigation Cost	N/A	
		Lifecycle Cost	N/A	
		Allocation of Costs	N/A	
	East Bay Saline Groundwater Desalination	Capital Cost	N/A	
		Operating & Maintenance Cost	N/A	
		Environmental Mitigation Cost	N/A	
		Lifecycle Cost	N/A	
		Allocation of Costs	N/A	
	Los Vaqueros Reservoir Expansion	Capital Cost	$1500M (2008 $)	Cost estimates from CALFED Los Vaqueros Expansion Studies (CALFED, 2004). Annual costs and potential cost-sharing options will be evaluated in future phases of the CALFED Los Vaqueros Reservoir Expansion studies.
		Operating & Maintenance Cost	$27.5M (2008 $)	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Regional Desalination Project	Capital Cost	N/A	
		Operating & Maintenance Cost	N/A	
		Environmental Mitigation Cost	N/A	
		Lifecycle Cost	N/A	
		Allocation of Costs	N/A	
	Mirant Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	Near Bay Bridge Desalination with Water Quality Element	Capital Cost	TBD[1]	Capital, operating and life-cycle costs for RDP elements to be determined as part of RDP. Conceptual-level Zone 7 intertie costs are estimated at $24M (2005$). Operational costs have not been estimated. Zone 7 life-cycle costs would need to consider cap
		Operating & Maintenance Cost	TBD[1]	
		Environmental Mitigation Cost	TBD[1]	
		Lifecycle Cost	TBD[1]	
		Allocation of Costs	N/A	
	South Bay Desalination - Irrigation Use	Capital Cost	N/A	
		Operating & Maintenance Cost	N/A	
		Environmental Mitigation Cost	N/A	
		Lifecycle Cost	N/A	
		Allocation of Costs	N/A	
	South Bay Desalination - Potable Use	Capital Cost	N/A	
		Operating & Maintenance Cost	N/A	
		Environmental Mitigation Cost	N/A	
		Lifecycle Cost	N/A	
		Allocation of Costs	N/A	
	Water Recycling	Capital Cost	Up to $98 M	Environmental mitigation costs are included in the capital cost estimate. In general, environmental mitigation was approximated as one to three percent of the total capital cost.
		Operating & Maintenance Cost	Up to $3.8 M/Yr	
		Environmental Mitigation Cost	Included in Capital Cost	
		Lifecycle Cost	Up to $11 M/Yr	
		Allocation of Costs	Up to $1,403/AF	0

Table G23-3 - Cost, Environmental and Implementation Score Card (Page 2 of 4)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Impacts to Environment	Bay Area Use of the Freeport Regional Water Project	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the regulating station and intertie would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby) etc. to avoid temporary construction effects. These mitigation measures would reduce short-term effects.	
	Supply	NA	
	Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Potential effects are primarily associated with terrestrial resources (habitat, species, wetlands), as expansion of the reservoir would require inundation of land. However, design of the facility would benefit aquatic resources, thus offsetting impacts to terrestrial resources. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include restoration and enhancement efforts on existing watershed lands and lands owned by potential partner agencies or open space managers. In addition, acquisition of additional land for protection, restoration, and/or enhancement would occur. Mitigation acreage would range from 1,953 to 8,576 acres. Effects on recreation would be offset by the restoration and augmentation of trails (increase in 17 miles of trails).	
	Mirant Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of the intertie facilities would primarily consist of temporary construction-related effects. No long-term operational effects are anticipated for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	**Overall Impacts to the Environment (Before Mitigation): Low Impact.** Construction and operation of recycling facilities would primarily consist of temporary construction-related effects. No long-term operational effects are expected for this concept. **Overall Impacts to the Environment (After Mitigation): No Impact.** Mitigation opportunities include alternative siting of facilities to avoid sensitive resources (if any), preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (i.e. sediment and erosion controls), restriction on construction schedule (e.g., during breeding / nesting season of raptors if nests are found nearby), etc. to avoid temporary construction effects. These mitigation measures would ensure that short-term effects are reduced.	

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.

Table G23-3 - Cost, Environmental and Implementation Score Card (Page 3 of 4)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Environmental Impacts[1]			
Overall Benefits to Environment	Bay Area Use of the Freeport Regional Water Project	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** Storage of water from the Sacramento River in the Zone 7 aquifer could reduce groundwater salinity. Because Zone 7 utilizes some groundwater for drinking purposes, reduction of salinity would improve the groundwater quality, wastewater quality and increase water recycling opportunities. In addition, the provision of water directly to Zone 7 retailers could reduce a like amount of pumping from either the SWP or the groundwater basin. **Overall Benefits to the Environment (After Mitigation): No Benefits.** Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Calaveras Reservoir Expansion - Water Supply	NA	
	Calaveras Reservoir Expansion - Water Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	**Overall Benefits to the Environment (Before Mitigation): High Benefits.** Potential benefits associated with the proposed concept include the following: - Installation of state-of-the-art fish screens for diversions to the SBA, - Flexibility to shift the timing and location of water diversions to protect fish, - System flexibility to store and move water (including for environmental water storage); also, provision of additional storage (for natural disasters, toxic spills, or levee failures in the Delta). **Overall Benefits to the Environment (After Mitigation): High Benefits**. Benefits would then be associated with increased protected and restored land as well as additional recreation opportunities (see mitigation opportunities above).	
	Mirant Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits**. Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Near Bay Bridge Desalination with Water Quality Element	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** If use of this supply source by Zone 7 during normal years reduces spring pumping from the Delta, there would be environmental benefits to the Delta. **Overall Benefits to the Environment (After Mitigation): No Benefits**. Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	**Overall Benefits to the Environment (Before Mitigation): Low Benefits.** The potential benefits associated with the proposed concepts include offsetting the development of higher capacity water supply projects. This translates to a potential reduction in environmental impacts associated with the construction and operation of larger water-related facilities. **Overall Benefits to the Environment (After Mitigation): No Benefits**. Mitigation opportunities implemented as part of the concept would not likely provide additional benefits to the environment.	
Implementation Potential			
External Support	Bay Area Use of the Freeport Regional Water Project	TBD[2]	Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.
	Calaveras Reservoir Expansion - Water Supply	NA	
	Calaveras Reservoir Expansion - Water Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	TBD[2]	
	Mirant Desalination with Water Quality Element	TBD[2]	Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.
	Near Bay Bridge Desalination with Water Quality Element	TBD[2]	Use of desalination, water recycling and enhanced conservation rather than storage concepts have historically been viewed as environmentally friendly alternatives and generated most external support.
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	TBD[2]	Many of these projects have already made significant investments in public outreach and have gained external support from various environmental groups, community organizations and the general public. Some outreach hurdles, however still remain, especially in documenting the safety of recycled water.
Ability to Get Outside Funding	Bay Area Use of the Freeport Regional Water Project	TBD[2]	Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.
	Calaveras Reservoir Expansion - Water Supply	NA	
	Calaveras Reservoir Expansion - Water Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	TBD[2]	Potential funding sources include any combination of federal (USBR), state (DWR) and local (Bay Area water agencies using the facilities).
	Mirant Desalination with Water Quality Element	TBD[2]	Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.
	Near Bay Bridge Desalination with Water Quality Element	TBD[2]	Commitment to softer path alternatives such as desalination, water recycling and enhanced conservation, as well as the large number of benefiting agencies, will increase the likelihood of external funding.
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	TBD[2]	The ability to get outside funding, even with a well documented plan, is still somewhat uncertain. However, the outlook on state and federal funds is more optimistic compared to recent years. The CALFED Bill that was recently passed by Congress will provide some funds.
Consistency with Local and Regional Plans	All concepts	NA	Insufficient information to determine consistency. Most projects can be made to be consistent with agency plans.

1. This section provides a general environmental score. For detailed scoring on several environmental topics see Table 4.
2. To be determined in future studies.

Table G23-3 - Cost, Environmental and Implementation Score Card (Page 4 of 4)

Performance Measure/Objective	Concept	Amount or Rating	Notes/Other
Regional Perspective			
Number of Agencies Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	280,000 people	Zone 7
	Supply	NA	
	Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	4	ACWD, CCWD, SCVWD, Zone 7, SFPUC
	Mirant Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Near Bay Bridge Desalination with Water Quality Element	1	CCWD, EBMUD, SFPUC and SCVWD will receive benefits either directly or indirectly from the base RDP facility. This concept could provide a benefit to one additional agency, Zone 7.
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	6,000,000 people	ACWD, BAWSCA, CCWD, EBMUD, SFPUC, SCVWD, Zone 7
Population Receiving Benefits	Bay Area Use of the Freeport Regional Water Project	280,000 people	
	Supply	NA	
	Quality	NA	
	East Bay Saline Groundwater Desalination	NA	
	Los Vaqueros Reservoir Expansion	4,400,000 people	
	Mirant Desalination with Water Quality Element	280,000 people	
	Near Bay Bridge Desalination with Water Quality Element	280,000 people	
	Regional Desalination Project	NA	
	South Bay Desalination - Irrigation Use	NA	
	South Bay Desalination - Potable Use	NA	
	Water Recycling	6,000,000 people	

Table G23-4 - Environmental Score Card (Page 1 of 5)

Measure/Objective	Concept	Concept Rating
Aquatic Environment		
Potential Impacts to Aquatic Environment	Bay Area Use of the Freeport Regional Water Project	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Diversion of water during wet and average years of winter months (under high flow conditions) would not likely have adverse effects on Delta fisheries as less than one percent of flow would be diverted in any winter months, and the existing intake is equipped with a fish exclusion system. Additional studies would be required to confirm this assessment. Construction of concept facilities (regulating station and pipeline) would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Aquatic Environment (Before Mitigation). Benefits**. Reduces direct fish losses from water diversions (incremental increase in loss of juvenile fish at the new Delta intakes offset by a substantial reduction in direct fish loss at the SWP [or CVP] diversion facility), through state-of-the-art fish screens, operational flexibility, and an increase storage of EWA water (up to 70,000 af/year in dry year yield). **Effects on Aquatic Environment (After Mitigation): No Effect.** The concept was designed to minimize potential effects to aquatic environment. Thus, no mitigation measures would be required.
	Mirant Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 15,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Operation of the existing desalination plant during average years would unlikely result in adverse effects to aquatic resources, as withdrawal of water for production of up to 10,000 afy would constitute a small percentage of overall flow. Construction of the intertie pipeline between EBMUD and Zone 7 service areas would result in minimal effects to the aquatic environment from stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Aquatic Environment (Before Mitigation): Impacts.** Potential impacts to aquatic resources if improperly treated reclaimed water is discharged into biological sensitive areas. Construction of the concept facilities would result in minimal effects to the aquatic environment associated with stormwater runoff to nearby creeks and drainages. **Effects on Aquatic Environment (After Mitigation): No Effect.** Mitigation opportunities to reduce potential impacts on sensitive biological resources include compliance with Title 22 requirements on treatment standards. Mitigation opportunities to reduce temporary impacts to aquatic resources include erosion and sediment control BMPs to prevent discharges into adjacent water bodies.

Table G23-4 - Environmental Score Card (Page 2 of 5)

Performance	Concept	Concept Rating
Terrestrial Environment		
Potential Impacts to Terrestrial Environment (acreage affected)	Bay Area Use of the Freeport Regional Water Project	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the pipelines and regulating station have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restrictio on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Total direct effects from both reservoir expansion and facilities construction: - Total direct effects to terrestrial habitat of up to 2,595 acres (permanent and temporary). - 2,081 acres of grassland - 309 acres of oak woodland - 11 acres of chaparral / upland scrub - 0.01 acre of riparian - 3.6 acres of urban-ruderal - 189 acres of agriculture - 1,960 acres from inundation. **Effects on Terrestrial Environment (After Mitigation): Benefits.** The Mitigation strategy would provide for resource enhancement in accordance with CALFED Program guidance and in coordination with regional conservation. It includes a combination of increased and expanded efforts on the existing watershed lands, restoration and enhancement efforts on land owned by potential partner agencies or regional open space managers, and acquisition of additional land for protection, restoration, and / or enhancement. Mitigation acreage requirements would range from 1,953 to 8,576 acres (CALFED, 2004).
	Mirant Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been determined, so the actual biological effects cannot be defined or quantified. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restrictio on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Terrestrial Environment (Before Mitigation): Impacts.** Locations of the intertie facilities have not been established, so the actual biological effects cannot be determined. However, these facilities would likely be located along road rights-of-way and other disturbed areas. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restrictio on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies; conduct habitat assessments, acquire relevant permits and comply with permit conditions.
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Terrestrial Environment (Before Mitigation): Impacts**. Locations of the recycling plants, pipelines, pump stations, and appurtenant facilities would differ for each concept. They have not been determined, so the actual biological effects cannot be defined or quantified. Temporary construction-related effects to terrestrial resources may occur if new facilities are located on or adjacent to sensitive terrestrial habitats. **Effects on Terrestrial Environment (After Mitigation): No Effect.** Mitigation opportunities include alternative siting, special construction techniques or restrictio on construction schedule. Other measures include: implement standard BMPs, consult with regulatory agencies, conduct habitat assessments, acquire relevant permits and comply with permit conditions.

Table G23-4 - Environmental Score Card (Page 3 of 5)

Performance	Concept	Concept Rating
Wetlands		
Potential Impacts to Wetlands (acreage affected)	Bay Area Use of the Freeport Regional Water Project	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies; acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Wetlands (Before Mitigation): Impacts.** Total direct effects from inundation would be 1.3 acres. **Effects on Wetlands (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes wetlands.
	Mirant Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts**. Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary construction activities. **Effects on Wetlands (After Mitigation): No Effect**. Mitigation opportunities to reduce temporary impacts to wetland resources could include, but not be limited to, restriction on the construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Wetlands (Before Mitigation): Impacts.** Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, such effects would likely be temporary in nature. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities to reduce temporary impacts to wetland resources could include, but are not be limited to, restriction on construction schedule (e.g., construction during dry season through creeks) and erosion and sediment control BMPs to prevent discharges into adjacent wetlands.
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Wetlands (Before Mitigation): Impacts**. Although the locations of project facilities have not been determined, they would likely be located in disturbed areas to avoid wetland resources to the extent feasible. If construction occurs through wetlands, it would likely be associated with temporary, construction activities. **Effects on Wetlands (After Mitigation): No Effect.** Mitigation opportunities include: alternative locations to avoid wetlands, conduct wetlands delineation, restriction on the construction schedule, and implementation of special techniques / BMPs during construction near wetlands. If wetlands cannot be avoided, mitigation opportunities include consultation with regulatory agencies, acquisition of relevant permits, compliance with permit conditions, and monitoring during construction. Permits may requirement replacement of wetlands at a ratio of 3:1 (actual ratio determined by negotiations with regulatory agencies).

Table G23-4 - Environmental Score Card (Page 4 of 5)

Performance	Concept	Concept Rating
Special-Status Species		
Potential Impacts to Special-Status Species (number of species)	Bay Area Use of the Freeport Regional Water Project	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Effects on Special-Status Species (Before Mitigation): Impacts.** Each habitat type identified under “terrestrial environment,” above, is associated with special status species, including but not limited to: - San Joaquin kit fox, - California red-legged frog, - California tiger salamander, - Western pond turtle, - Bald eagle, - Curved-foot hygrotis diving beetle, - Mason’s lilaeopsis, - Alkali milk-vetch, - Heartscale, - Brittlescale, - San Joaquin spearscale, - Recurved larkspur, - Contra Costa goldfields, - Vernal pool fairly shrimp, etc. **Effects on Special-Status Species (After Mitigation): No Effect.** See Mitigation strategy identified under Terrestrial Resources, above, as the calculation for the restoration acreage includes protection of habitat that support these species.
	Mirant Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Near Bay Bridge Desalination with Water Quality Element	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to, preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Effects on Special-Status Species (Before Mitigation): Impacts.** As described above, concept facilities would be located in disturbed areas to the extent feasible. Avoidance of sensitive habitat would also avoid special status species to a large extent. Any effects to special-status species would be temporary and associated with construction activities. **Effects on Special-Status Species (After Mitigation): No Effect.** General mitigation opportunities to reduce short-term construction and potentially long-term effects to special-status species include, but are not limited to preconstruction surveys (e.g., for special-status raptor nests), implementation of standard BMPs (e.g., buffers or fencing to avoid special-status species), and restriction on construction schedule (e.g., during nesting or breeding season).

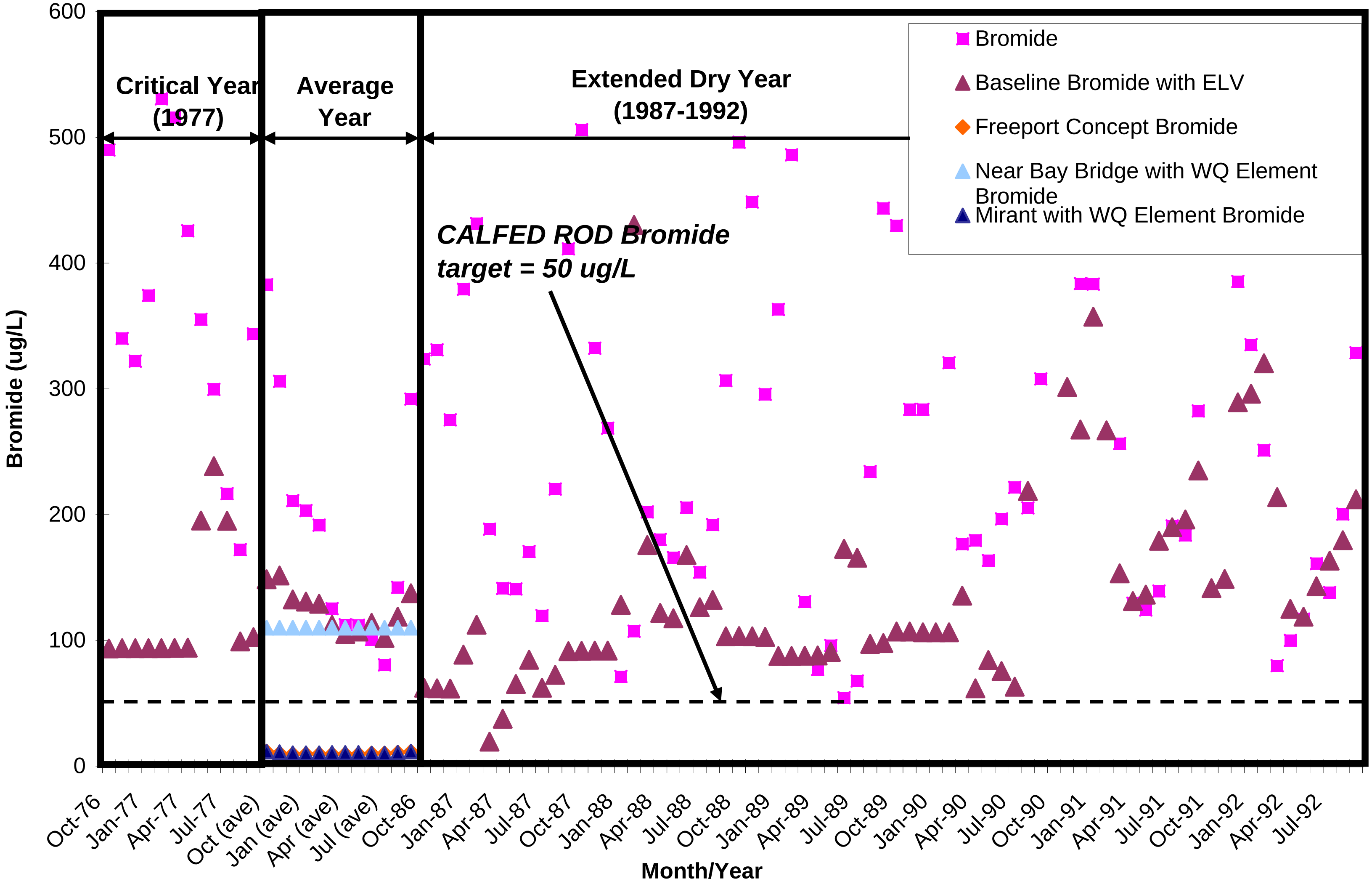
Table G23-4 - Environmental Score Card (Page 5 of 5)

Performance	Concept	Concept Rating
Energy Consumption		
Potential Increases in Energy Consumption (amount of energy required for facility operation) Potential Increases in Criteria Pollutant (Nox, Sox, ROG and CO) Production	Bay Area Use of the Freeport Regional Water Project	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases**. Actual energy consumption not known. Operation of the existing facilities during the average to wet years would offset some amount of pumping of SBA facilities. The energy demand of concept facilities is expected to be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.
	Calaveras Reservoir Expansion - Water Supply	NA
	Calaveras Reservoir Expansion - Water Quality	NA
	East Bay Saline Groundwater Desalination	NA
	Los Vaqueros Reservoir Expansion	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** The proposed concept would consume 183 million kwh of energy. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Further studies would be needed to assess impacts and the potential need for installation of hydroelectric plants.
	Mirant Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.
	Near Bay Bridge Desalination with Water Quality Element	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): TBD[1].** Actual energy consumption associated with concept operations is not known, but would be associated with operations of the desal plant, pipeline, and pump station during average or wet years. This concept would require only partial operation of the plant, and thus a proportionate amount of energy consumption. Some of that energy consumption may be offset by a reduction in pumping of SBA facilities. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): TBD[1].** Further evaluation would be required to determine the level of impact and mitigation opportunities.
	Regional Desalination Project	NA
	South Bay Desalination - Irrigation Use	NA
	South Bay Desalination - Potable Use	NA
	Water Recycling	**Energy Consumption / Criteria Pollutant Emissions (Before Mitigation): Increases.** Energy consumption would differ for each facility, depending on individual capacities. Energy consumption is generally expected to be 1,000 to 2,000 kWh/mg of water treated. The energy demand of an individual recycling facility would be small compared to PG&E's delivered capacity. Pollutant emissions would be associated with energy production. **Energy Consumption / Criteria Pollutant Emissions (After Mitigation): Increases.** Mitigation opportunities have not been identified to reduce the increase in energy usage.

1. To be determined in future studies.

Zone 7: Comparison of Concepts

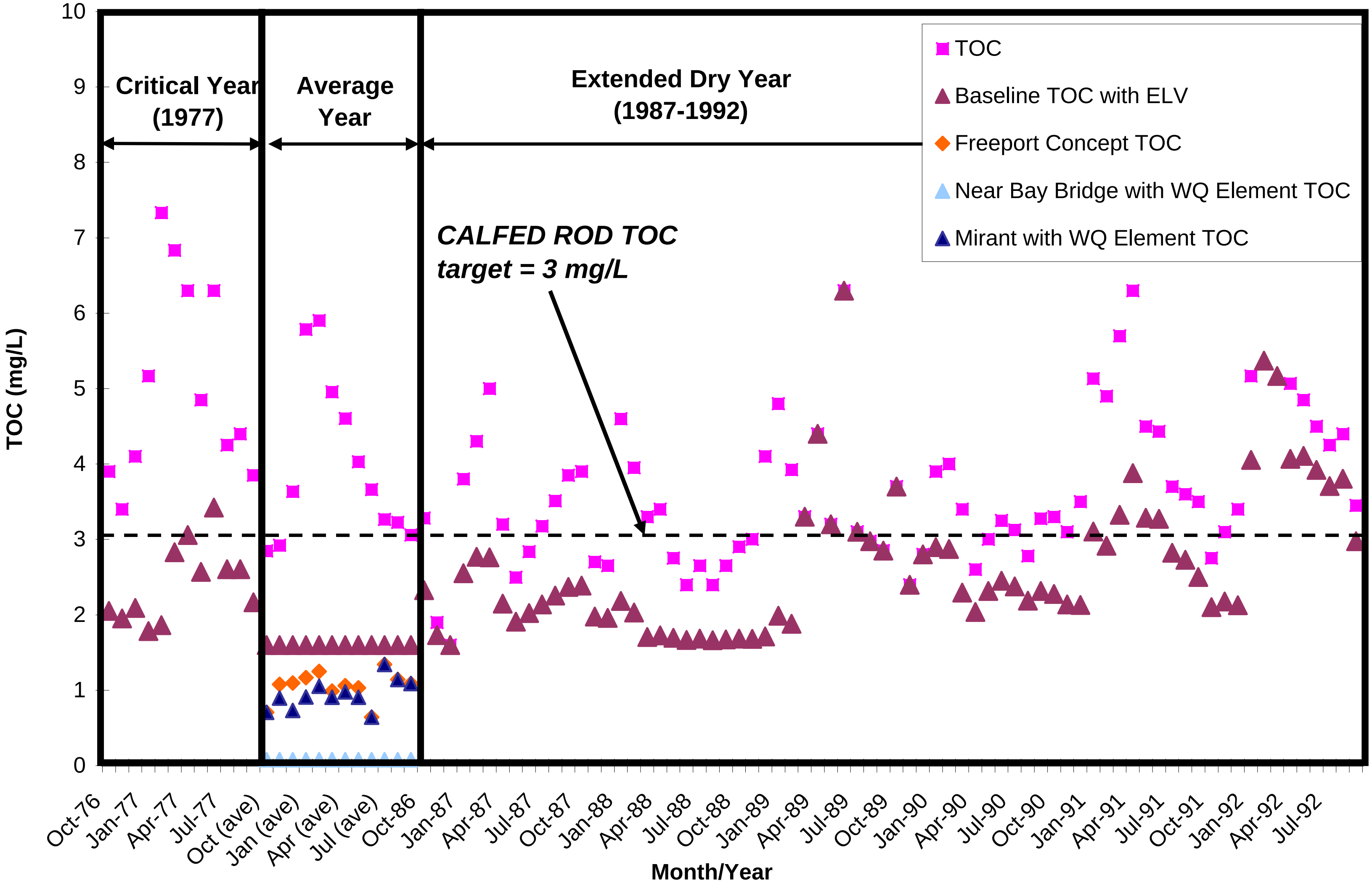
Comparison of Zone 7 Baseline Bromide with Concept Bromide



Note: Freport, Near Bay Bridge, and Mirant bromide will be blended with Zone 7 supplies in the distribution system, and will not affect source water bromide levels. ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

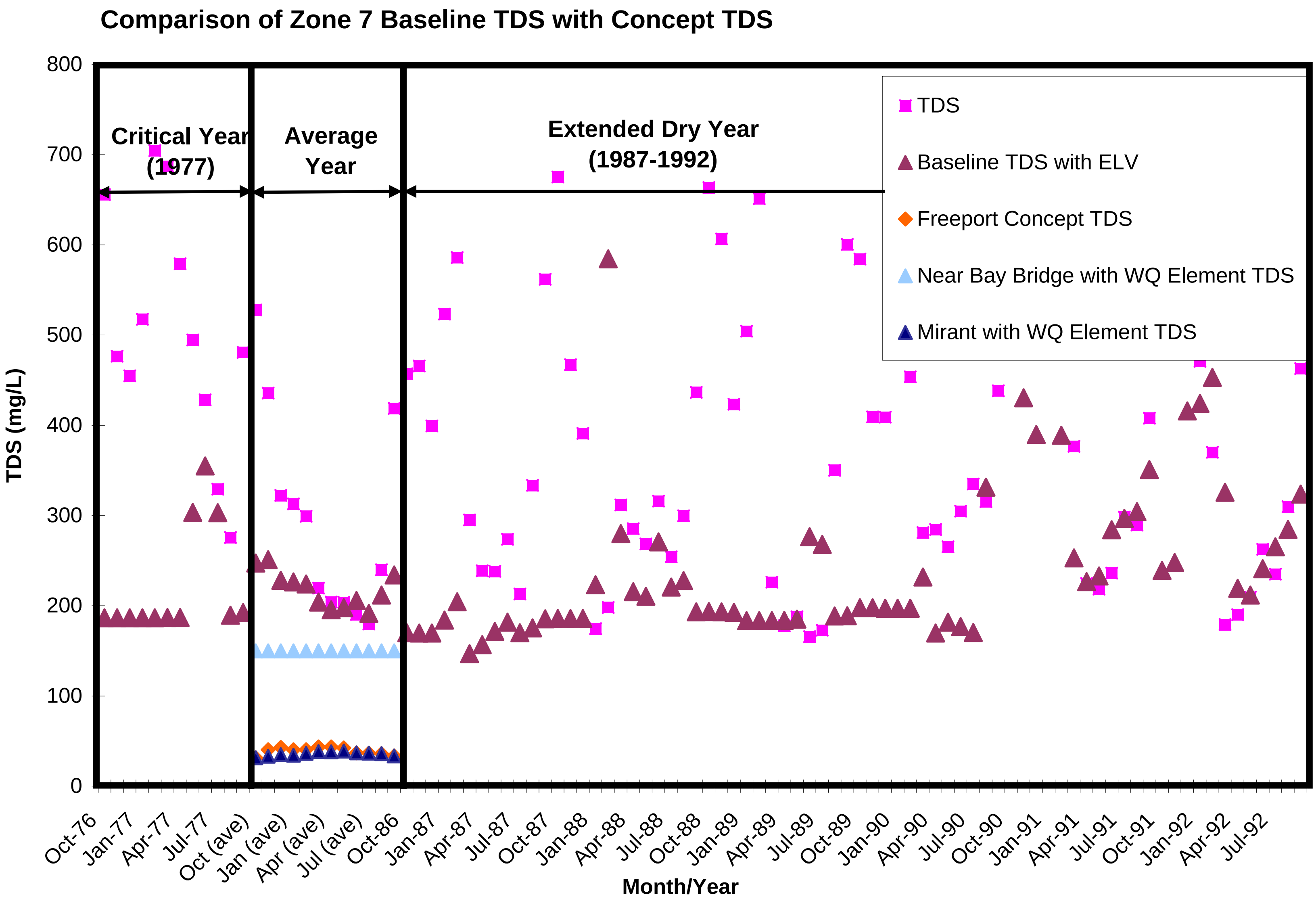
Zone 7: Comparison of Concepts

Comparison of Zone 7 Baseline TOC with Concept TOC



Note: Freport, Near Bay Bridge, and Mirant TOC will be blended with Zone 7 supplies in the distribution system, and will not affect source water TOC levels. ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Zone 7: Comparison of Concepts

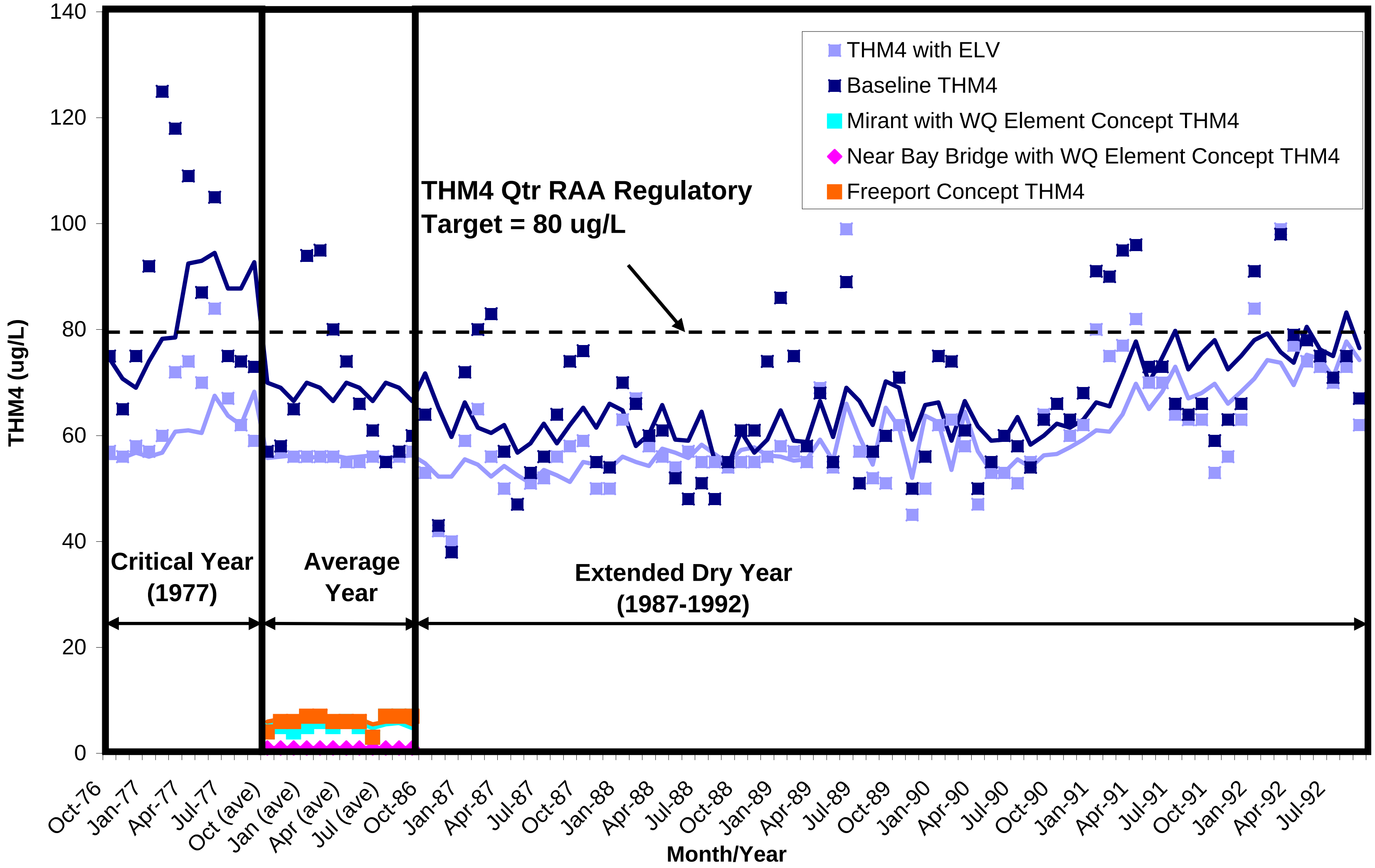


Comparison of Zone 7 Baseline TDS with Concept TDS

Note: Freport, Near Bay Bridge, and Mirant TDS will be blended with Zone 7 supplies in the distribution system, and will not affect source water TDS levels. ELV water quality is the mixture of Rock Slough, Old River and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies.

Zone 7: Comparison of Concepts

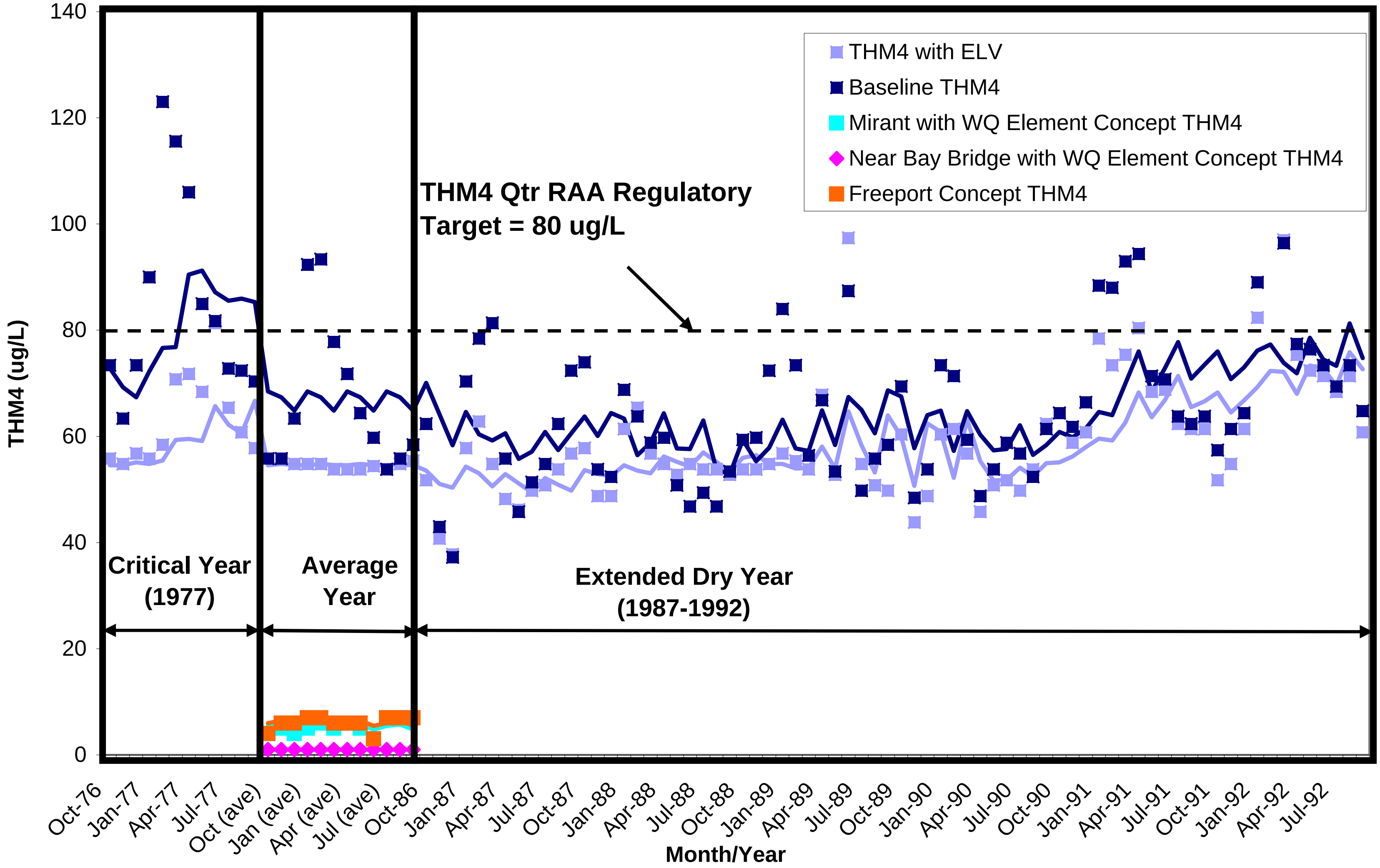
Comparison of Zone 7 Baseline THM4 with Concept THM4 (Conventional Treatment)



Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment. Mirant, Near Bay Bridge, and Freeport are treated supplies that would be blended with Zone 7 treated supplies in the distribution system.

Zone 7: Comparison of Concepts

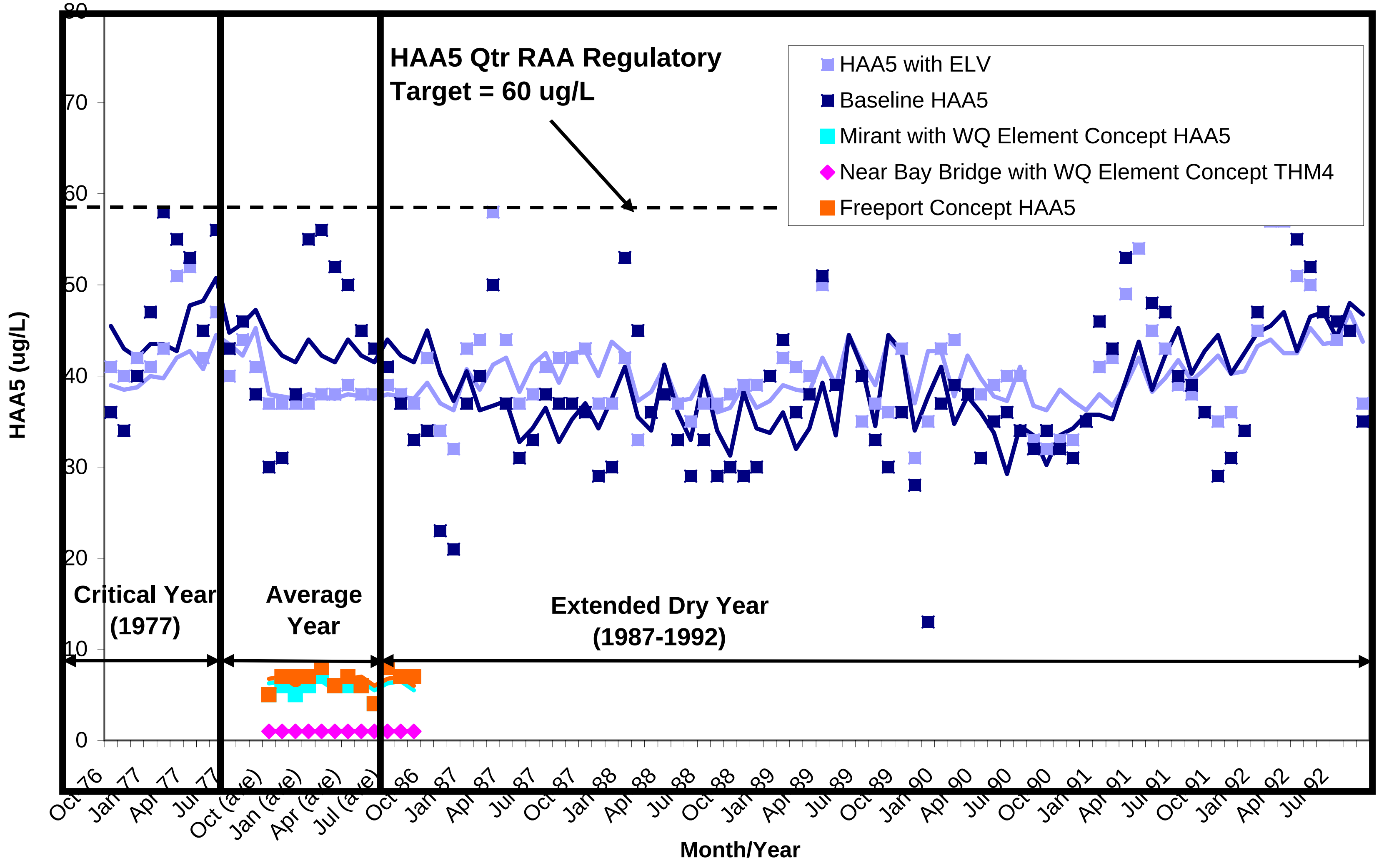
Comparison of Zone 7 Baseline THM4 with Concept THM4 (UF&Conventional Treatment)



Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming split stream with 80% conventional and 20% UF treatment. Mirant, Near Bay Bridge, and Freeport are treated supplies that would be blended with Zone 7 treated supplies in the distribution system.

Zone 7: Comparison of Concepts

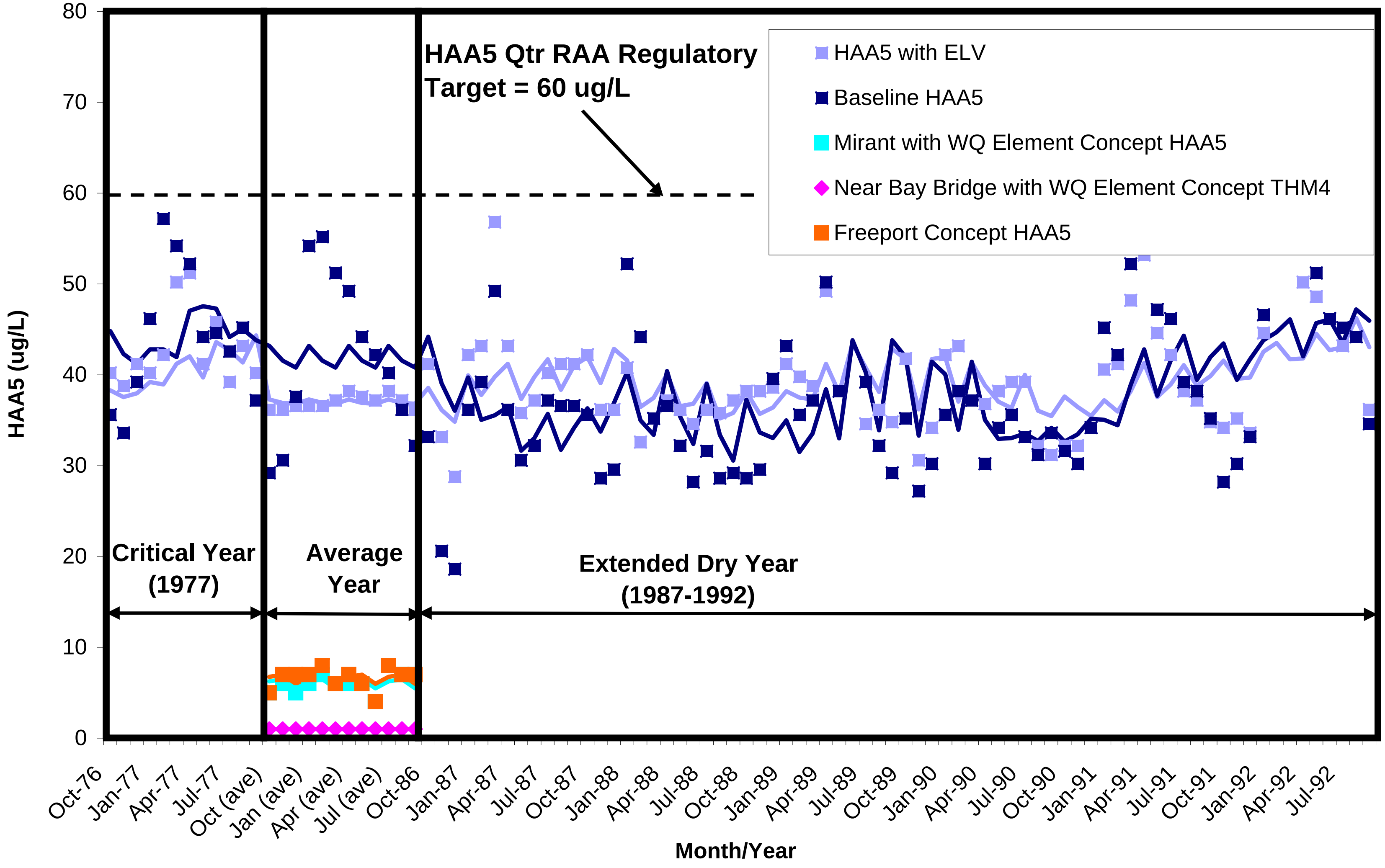
Comparison of Zone 7 Baseline HAA5 with Concept HAA5 (Conventional Treatment)



Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming conventional treatment. Mirant, Near Bay Bridge, and Freeport are treated supplies that would be blended with Zone 7 treated supplies in the distribution system.

Zone 7: Comparison of Concepts

Comparison of Zone 7 Baseline HAA5 with Concept HAA5 (UF&Conventional Treatment)



Note: ELV source water quality is the simulated mixture of SBA (at HOB Pumping Plant) and Los Vaqueros Reservoir diversions simulated in the CALFED Los Vaqueros Reservoir Expansion Studies. Simulated DBP production assuming split stream with 80% conventional and 20% UF treatment. Mirant, Near Bay Bridge, and Freeport are treated supplies that would be blended with Zone 7 treated supplies in the distribution system.